THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. VII. Nº 153—10th YEAR.] LONDON, AUGUST 31, 1858. [Subscription per Ann. { 15s. in Advance / 18s Credit.] With SUPPLEMENT Price 1s. 4d.

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By Her Majesty's Royal Letters Patent.

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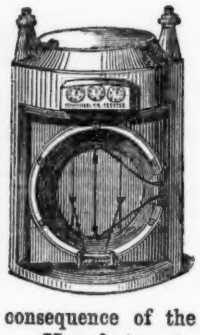
ESTABLISHED 1836.



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Wet Gas-Meters Repaired and Reconstructed with J. Meacock's Modern Improvements.

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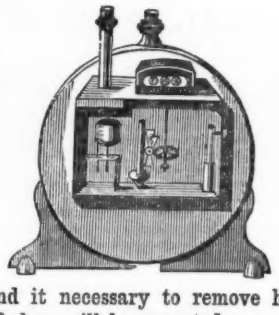

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GENERAL MINERAL AND METAL AGENT AND MERCHANT,
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Size.	Number of Burners.	Consumption of Cubic Feet of Gas per Hour.	Prices delivered to Carriers.
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Their superiority in not Obstructing the Light, in Form and Utility, render them worthy of the patronage of all Public Companies and others.

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BOILER & GASHOLDER MAKERS,
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Beg to draw the attention of Engineers and Managers of Gas Works to the superior quality of the Article they manufacture, both in respect of the iron employed, and the perfect manner in which it is welded; in proof of which they can refer to the testimonials of the most eminent Gas Engineers, and the experience of the principal of the large Gas Companies of the kingdom.

Orders promptly executed.

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CROSLEY & CO.,

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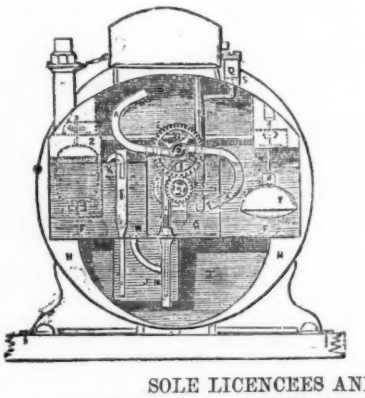

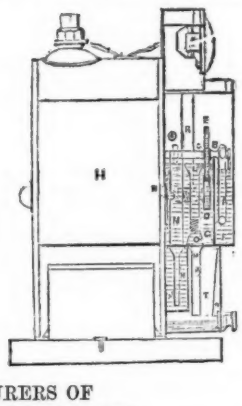

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W. CROSLEY'S AND CROSLEY AND GOLDSMITH'S
PATENT STANDARD SELF-ADJUSTING AND COMPENSATING GAS-METERS,

By which the True Water-Line is constantly maintained, and accuracy of measurement at all times secured. SEVERAL THOUSANDS OF THEM HAVE BEEN FIXED, AND ARE NOW AT WORK, and numerous Testimonials from eminent Gas Engineers, expressive of their approbation of them, may be seen at the Manufacturers'.

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Also, Manufacturers of EXPERIMENTAL METERS, GASHOLDERS, GOVERNORS, MINUTE-CLOCKS, PHOTOMETERS, &c. &c., similar to those used by Mr. King, of Liverpool.

C. and Co. continue to manufacture ordinary WET METERS of the very best description, Mr. W. Crosley having been for many years the principal and confidential assistant of his relative, the late Mr. Samuel Crosley, of Cottage Lane, City Road, up to the time of his decease, in which capacity he communicated to W. C. the secret of the mixture of the metals which has rendered the Crosley Meter so durable and superior to all others, as is evidenced by a large number of them being still at work after having stood the test of nearly a quarter of a century's use.

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NOTICES.

The subscription is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders must be made payable at the Charing-Cross Money-Order Office, to William H. Bennett, No. 42, Parliament Street, Westminster.

The next number will be published on Tuesday, Sept. 14, and the subsequent numbers on each successive alternate Tuesday.

Stamped copies, when forwarded by post, must be folded so as to expose the stamp; they are otherwise liable to the full postage charge for letters.

This JOURNAL has been duly registered at the General Post Office for transmission abroad.

All Communications to be addressed to the Editor, No. 42, Parliament Street, Westminster; and orders for Advertisements to the Publisher, Mr. W. B. King, No. 11, Bolt Court, Fleet Street.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 31, 1858.

NOTES UPON PASSING EVENTS.

It has often of late fallen to our lot to be obliged to protest against the very false philosophy (not to use a stronger phrase) of the Registrar-General of Births, Marriages, and Deaths; but, at the present day, the part of an advocate for common sense, and for truth, seems to be as little in favour with the British public as it was fabled to have been amongst the Trojans of old. The tendency of mankind to adopt implicitly fashionable theories must, indeed, always have proved the stumbling-block of those who were anxious to advance the real interests of their fellow-creatures; and the distaste with which earnest efforts to bring society back to the sound principles of reason and science have always been regarded, is the bitterest trial such sincere writers or thinkers have to encounter. Yet the duty of those who assume to watch over public interests is both plain and imperative. They are bound, in season and out of season, to protest against error, from whatsoever source it may proceed; and, at the risk even of wearying the few who may listen to their "cries in the wilderness," to repeat their protests as often as the occasions for uttering them may arise. And so we feel again bound to record our protest against both the doctrines and the inferences enunciated in the last publications of the Registrar-General, although by this course we may expose ourselves to the charge of repetition. When error is officially and frequently repeated, it ought, we hold, to be as often and as distinctly challenged.

In saying this, we allude especially to the affectation with which the Registrar-General continues to speak of the unnatural mortality, as he is pleased to call it, of London, and seeks to convey the impression that the negligence of the ruling powers of the Metropolis slays its tens of thousands yearly. Now, although unquestionably there is much to be done before London can become "a model city," or before its sanitary conditions can become such as to ensure to all of its inhabitants the full enjoyment of health and strength, there is something, we hold, so helplessly empirical in the manner in which the Registrar-General establishes his proposition, that a mortality of 17 in 1000 is the normal one, that the whole of the inferences he draws from it must at once fall to the ground. He says that the above rate of mortality is the normal one, because it prevails in a certain number of the most healthy districts in England, and that all deaths beyond those derivable from such a rule are preventible. Perhaps they might be, if men were disposed to abandon the advantages of civilization, or if they could alter the laws of what may truly be called "the inevitable destiny" of our nation. The mortality of 17 in 1000 is said to prevail in certain country villages, but no means are afforded, to the public at least, of even ascertaining that the returns on which that assertion is based are correct exponents of the facts of the case. Where do the fortunate Arcadians in question reside? where are the poor-houses, hospitals, and infirmaries of their neighbourhood situated? what is the annual rate of increase of population in those villages? what is the rate of the emigration? over how many years have the observations been extended? and, finally, are the geological, the climatological, or other external conditions of these villages, the same as those which prevail near the large centres of population. The replies to all these questions would, we fear, singularly puzzle the official alarmists of Somerset House; but they must all be known and allowed for ere any safe conclusions can be drawn, or any philosophical deductions made, from the facts which are connected with them. Possibly the bold, startling assumptions so often referred to, may induce real philosophers to examine what may be the relative mortalities of town or of country districts. At present, the public requires to be told that the calculations of the Registrar-General are merely founded on fanciful paradoxes; and that they are utterly worthless for the purposes either of discussion or of legislation.

There is, indeed, something so exquisitely absurd in the attempt to establish that a mortality, greater than that of the healthiest agricultural districts, is preventible in large towns, that it would be a waste of time to refute it, were it not unfortunately the case that the men who weekly repeat this solemn piece of nonsense are consulted by our legislators as oracles in all matters connected with public health. To those legislators we would, then, observe that, if on no other account, the mere fact that all our large towns are situated on the low-lying banks of rivers, and, generally speaking, in flat alluvial plains, must of itself constitute a very marked distinction between their climatological conditions, and those of the elevated, healthy agricultural districts wherein the oft-quoted low rate of mortality prevails. It cannot be a matter of small moment either, that the densities of the respective populations are so different; but the most important agents in producing the greater mortalities of towns are, firstly, the more harassing and fatal modes of occupation which there prevail; and, secondly, the far more unfavourable circumstances to which the infantine population is exposed in densely-peopled cities, than those to which it is exposed in agricultural districts. Mental toil, constant excitement, the follies and vices of large cities, must act seriously upon the health and strength of their populations; but it is amongst the children of the very poor that the greatest ravages of disease and death are to be found. It is our fortune to be compelled frequently to pass through the district of London situated near Clare, Covent Garden, and Newport Markets, about Gray's Inn Lane and St. Giles's; and fearfully have we become impressed with the conviction that the laws of mortality which prevail there must ever be—let the municipal arrangements be what they may—essentially different from those prevailing in the mountainous districts of Westmoreland. Charles Lamb used to say that "the children of the poor are dragged up, not brought up;" when "dragged up" through the filth, and, alas! too often the vice, of certain quarters of our cities, can we expect other results than a fearful increase of mortality, or a painful exhibition of the degeneration of our race? Yet it is to populations exposed to such evils that official wisdom would apply observations made in districts, wherein the mere absence of temptation secures immunity from the vice which is one of the main causes of the existing differences in the rates of mortality.

It may be said that in thus assigning a cause which may be, perhaps, so easily modified as the one thus mentioned, we are in fact admitting that the excess of town mortality is to a great

extent preventible; nor do we seek to avoid the accusation of an apparent inconsistency on this score. Much of our mortality *is* preventible; but that desired end must, we think, be sought in raising the standard of morals, and in refining the habits of the most numerous classes of our population, rather than in imposing upon society at large the duty of caring and thinking for them. The diffusion of a real education, or, in other words, a development of the principles of self-reliance and a sense of duty amongst the poor, would be a far more efficient mode of combating the evils they are exposed to, and which swell the mortality of our towns, than the establishment of any number of Boards of Health, or providing any number of paid Officers of Health or Registrars of Deaths. Our ground of objection to the theory of the leader of those equivocal blessings is, therefore, not so much that we dissent *in toto* from his proposition with respect to the preventibility of a part of the mortality we alike deplore, but because we believe that, by diverting attention from the real causes of that mortality, he exposes society to the danger of wasting its energies in futile attempts to obviate minor and imaginary evils, whilst it leaves untouched the more important real ones. The cause of truth can never be advanced by the promulgation of error; and it certainly *is* an error to say that the mortality of large towns can be made to approach that of healthy rural districts. Any reasoning founded upon such assertions must be affected by the false data on which it is founded.

By way of illustrating the utter irrelevance of the cases cited by the Registrar-General, we would call attention to two very distinctly marked extremes in the rates of town mortality. At Croydon it appears that, in the last quarter of the year, the rate was only equivalent to an annual mortality of 15 in 1000; whilst in the year 1853 the rate in Amsterdam was not less than 35 in 1000. But it by no means follows that these were normal conditions in either case; still less does it follow that the healthiness of the latter district can ever be made equal to that of the former. In the meantime, the inhabitants of Croydon have great reason to be satisfied with the present sanitary condition of their town.

Another reason why we object both to the letter and to the tendency of the recent publications of the Registrar-General is, because we believe that the comparative tables he so ostentatiously publishes of the purity of the various water supplies is calculated to produce much dissatisfaction with the London Water-Works Companies; when, in fact, there is no reason for the existence of such a feeling, and when it is utterly impossible to attain anything like the standard of purity the governmental critic appears to desire. Possibly the waters of Loch Katrine, which flow from an uncultivated district of barren primary formations, may contain less extraneous matters than those pumped into London. But it is still a moot point whether or no absolute purity be a desideratum in a town supply; and still greater doubt exists as to the precise value of the objections raised to the peculiar class of inorganic impurity to be found in Thames or Lea waters. Many far more able men than the Registrar-General hold that the presence of a certain proportion of the bicarbonate of lime is a necessity, or at least a desirable condition, in the waters intended for human consumption. If, however, this were not the case, the question still remains to be solved of whence else than in the Thames and its affluents is the quantity of water necessary for London to be obtained? The disgusting nonsense of the "gathering-grounds" scheme has long since been exposed; the hopes of obtaining a supply from artesian wells sunk into the subcretaceous formations have been "nipped i' the bud" by the results of the Highgate and of the Harwich wells (although we see, by the way, that a further attempt of this nature is to be made at the rising village of Walton-on-the-Naze, so hard is it to persuade men to things which are not pleasant!); the Bala-Lake scheme may, indeed, at some remote period be revived, when London shall have again doubled its population, and its rivers shall have been still further affected by land drainage. Until, however, that period shall arrive, there is no other source than the Thames; and whether we like its waters or not, we must put up with them. It is therefore a folly, almost equal to a wickedness, on the part of the Registrar-General, to strive thus constantly to create a feeling of dissatisfaction, when he must know that there is no means of relieving it, of a practical nature at least. It is worth while observing, moreover, that the marked improvement which is said to have taken place in the health of Croydon, has accompanied a change from the use of the soft waters of the basement beds of the London clay to the use of the hard waters from the Chalk, which are, in fact, the analogues of those of the Thames and its affluents. In the usual official style of reasoning ("*post hoc propter hoc*"), the advocates of the London Water Companies might say that the improvement in the health of this particular district was thus to be explained.

In Lincolnshire we observe that the causes which have proved so injurious to the Thames are producing similar effects in the stagnant waters of the Fossdyke and the Witham. The self-styled Sanitary Reformers have, with their usual want of discrimination, urged here likewise the introduction of water-closets; utterly regardless of the consequences of contaminating the natural or artificial outfalls of the district. At Worksop the same result is beginning to make itself felt, and the river is rapidly becoming a public nuisance. Yet such gratuitous quackery as that of the Manchester and Salford Sanitary Association was allowed to sway the decisions of the Legislature; and thus to force upon the great municipal council of our cotton metropolis a system they knew to be inapplicable to their district, and which they also knew would be productive of fatal consequences to the very cause of sanitary improvement so absurdly and so indelicately paraded! How little wisdom is necessary to govern the world!

We hear that a concession has lately been granted by the Austrian Government for a Water Company for the town of Vienna, and that the scheme itself will shortly be submitted to the London public. After the disastrous result of the Berlin Water-Works, it is hardly probable that English capital would be found for any such purpose, in the case of a German city at least; nor until a great change takes place in continental habits do we think that the result of a speculation of this nature would be satisfactory in any other countries of the continent than in Holland or in Belgium. People abroad bathe a great deal, but they do not habitually use much water in their houses, or for the supply of their daily wants; and at Berlin, or even at Amsterdam, the demand for house supplies of water has forcedly been created by the parties supplying. At Vienna it is possible that the existence of an imperial court, and of a wealthy and luxurious nobility, may give rise to a higher state of civilization and refinement; but it is sorely to be suspected that, unless the Government should have guaranteed a minimum dividend, the shareholders of the projected Company will not find themselves in a more prosperous position, after their first year's working, than the unfortunate shareholders of the Berlin Water Company. In the case of the works of the last-named town, it appears also that a very heavy addition has lately been made to the capital account, for the purpose of relaying the pipes. It is said that originally the pipes were only laid about two feet below the surface of the ground; *now* it is found necessary to lay them not less than five feet below the surface, in order to protect them from the effects of frost. Surely this danger ought to have been foreseen; for there is nothing unknown as to the conditions of water-pipes, under even colder climates than that of Berlin in the winter. Alas! however, for the shareholders! it is to be feared that the number of the "unwashed" in that city will be more chilling to their prospects of a dividend than the physical cold has already been to their pipes—though the money value of the last cited injury is by no means a light one to an unsuccessful company. We rather dwell upon this Berlin mishap, because there appears to exist a tendency to launch foreign investments upon our market; and it is, therefore, important to utter friendly warnings in time. The tale of the conduct of the Amsterdam Town Council towards the Railways near that town may also have a moral to our speculators, if they would but ponder well over it; and so likewise may the fearfully alarming notice on the subject of the London pump water, inserted in a subsequent part of our JOURNAL. If we may believe the medical authors who write these horrible tales, there is "death in the pump;" but, oddly enough, people will obstinately persist in living, even though they habitually drink these liquid poisons. No doubt many of the shallow wells of London are affected by the infiltrations from the cesspools and sewers of the town, but either the dwellers therein are a race of Mithradates, poison-proof from long custom, or, after all, the waters charged with nitrates are not so bad as they are said to be. But if they actually should be so fatal, what are we to say of the parties who propose to use the shallow spring waters in the Serpentine, and have already used them in St. James's Park? Before the latter operation was carried into effect, the public was duly frightened with official analyses of the waters contained in the ornamental lake, and

by pictures of the "gorgons and chimeras dire" to be discovered (by the aid of the microscope) therein. Why do not these disinterested alarmists continue their studies on the new sources of supply?

In the meantime we would add, that it appears from the local papers that all the deep wells, even of the chalk formation, have been seriously affected by the recent long-continued dry weather. Is it not to be suspected that the great extension lately given to the system of land drainage has materially diminished the supply to the deeper seated springs? So closely are good and evil intermingled in this world of ours!

A very remarkable illustration of the mischievous consequences of anonymous journalism may be observed at the present time in the fictious excitement created by the articles in the *Times* on the subject of private lunatic asylums. Fortunately, this subject has "turned up" at the commencement of the recess, and there is a probability that before Parliament meets again the truth of these matters may become known. But certainly, in the present state of public feeling, our *Times*-ridden nation would be very likely to sacrifice, without inquiry, a very valuable class of institutions, and to open the door to an amount of villany which it is frightful to contemplate. The explanation of the course taken by the "*Times*" in this question is said to be that Mr. Mowbray Morris has quarrelled with Dr. Forbes Winslow, and that Mr. H. Stevens, the medical officer of one of the public asylums, has espoused the cause of the former. It would be difficult to ascertain the truth of these rumours; but, whether they be literally true or not, it is sad to observe that the welfare of the thousands of helpless unfortunates who are mainly affected by such discussions may be at the mercy of any clique of self-constituted guardians. Nothing, in fact, but the extreme liberty of the press can counteract the dangers and inconveniences of the anonymous authorship we ourselves regard with such jealousy.

Circular to Gas Companies.

That our much-vaunted jury system is, for the most part, an excellent one—that it may be safely trusted to decide cases capable of being judged on general knowledge or intelligence—and that it is invaluable in protecting the weak from the oppressions of the strong, are propositions that, having been confirmed by the experience of centuries, must be looked upon as almost indisputable. But, unfortunately, in cases requiring special technical knowledge, it has over and over again proved itself incompetent; and in cases involving the rights of powerful corporate bodies, as opposed to individual claims or trespasses, a jury has been ever apt to decide according to its own well-founded or ill-founded sympathies with the individual, rather than upon strict legal evidence. Both these circumstances undoubtedly contributed to the recent verdict in the case of *Hills v. the London Gas Company*. Mr. Hills appealed to the sympathies of the jury as a meritorious, peaceable man, oppressed by a combination of powerful companies; and the case itself involved many technical points which, after the mystifications of a five days' trial, the jury were utterly unable to comprehend. Yet, in reality, the case was very simple. Mr. Hills, in his patent of November, 1849—specified in May, 1850, and altered by disclaimer in June, 1856—makes two distinct claims, which form the subject of the present dispute. He claims, firstly, the use of hydrated or precipitated oxide of iron, mixed or unmixed with other purifying materials, to remove the sulphuretted hydrogen from crude coal gas. He claims, secondly, the repeated renovation or revivification by exposure to air of this mixed or unmixed oxide of iron after it has ceased to purify, whereby it may be used successfully over and over again. Of course if Mr. Hills is entitled to neither of these claims, his patent is bad; and it was laid down distinctly, both by counsel and judge, that if either claim should prove to be unfounded, the patent would be also bad, and could not be sustained.

With regard, then, to the first claim, as to the use of hydrated oxide of iron for removing sulphuretted hydrogen from coal gas—had there been any prior publication of this process in writing or in practice, by word or deed? for here again the judge, Baron Bramwell, was most explicit in his charge to the jury, and pointed out to them that a legal publication might be in writing alone, or it might be in actual practice alone, or it might be in both combined. The evidence to show prior publication was as follows:—

Firstly, for years past it had been matter of common knowledge that some forms of hydrated oxide of iron would absorb and chemically combine with sulphuretted hydrogen gas.

Secondly, Mr. Croll, in the year 1840, took out a patent for improvements in the manufacture of gas, and in his specification we read that the gas, having been purified from ammonia and partly from sulphuretted hydrogen, "should have a further purification in order to free it from the remaining portion of sulphuretted hydrogen, which purification is to be effected by means of the oxides hereinafter described." A little further on Mr. Croll points out "the application of the black oxide of manganese to remove or free coal gas from sulphuretted hydrogen," for which purpose he damps it and disposes it in a dry-lime purifier; and then states that "the same effect may be produced by the application of the oxide of zinc and the oxides of iron, and treated in precisely the same way as above described." Lastly, he says, "I claim . . . . . the purification of gas from sulphuretted hydrogen by means of the oxide of manganese, the oxides of iron, and the oxide of zinc, as hereinbefore mentioned." It was admitted by all that the general term, "oxides of iron," would include every variety, whether hydrated or anhydrous; that the hydrated oxide—common rust, for instance—was the more ordinary or natural form of oxide of iron; and that, from its well-known chemical properties also, the hydrated oxide was more likely to be selected than the anhydrous for the purposes of gas-purification. Some stress was laid by the plaintiff's counsel upon the fact that Mr. Croll in his patent, after describing the use of the oxide of manganese, points out a method of revivifying it by making it red-hot, and indicates that the used oxides of iron are to be revivified in the same way, whereby they would of necessity become anhydrous; but this has clearly no bearing upon the condition of the oxides of iron when first employed. On the other hand, the defendants' counsel contended, and the judge in his summing up approved, that, inasmuch as there were both hydrated and anhydrous oxides that would purify gas, as well as hydrated and anhydrous oxides that would not purify gas, Mr. Croll's general specification of "oxides of iron" was preferable to, and embraced Mr. Hills' specification of hydrated oxide of iron only.

Thirdly, Mr. Croll, whose evidence was not in any way questioned, stated that in the year 1840, during a period of several months, he occasionally purified, publicly, without any concealment, as much as 20,000 cubic feet of gas per day, by means of hydrated oxide of iron, at the Chartered Gas Company's station in Brick Lane, and that the gas so purified was supplied to the public for consumption. He described the two processes by which he had prepared his oxide of iron, whereby it was evident that the substance he used must necessarily have been hydrated. Moreover, one of his processes, namely, that of precipitating sulphate of iron with lime, was identically the same, both in detail and result, as one of the processes prescribed and employed by Hills for obtaining his hydrated oxide of iron; while his other process, namely, that of precipitating sulphate of iron with crude gas, though it differed a little in detail, was identically the same in result as another of the processes prescribed and used by Hills, namely, that of precipitating sulphate of iron with gas liquor or hydro-sulphuret of ammonia. Mr. Croll also revivified his hydrated oxide of iron by spreading it and stirring it on the top of the hot retort-beds—a process different from that described in his specification, and which, though not identical with that of Hills, had this point in common, that it did not, any more than that of Hills, necessarily render the material anhydrous. Upon this evidence the jury was asked to say whether Mr. Hills' publication in 1849-50, *quoad* the use of hydrated oxide of iron, had not been anticipated by Mr. Croll in 1840, by his specification, or by his practice, or by both combined, the one as explanatory of the other. The jury decided that Mr. Hills' publication had not been so anticipated, and thereby declared that Mr. Croll in 1850 was prohibited, save by the permission of Mr. Hills, from doing that which he had patented and practised ten years previously.

Fourthly, Mr. Laming took out a patent in 1847 for purifying coal gas, &c., and in his specification he points out the use of hydrated oxide of iron for absorbing the sulphuretted hydrogen of the crude gas. He makes two distinct claims on this head, which demand separate attention,—the one for using what he calls "carbonate of iron," mixed or unmixed; the other for using oxide or carbonate of iron mixed with chloride of calcium. Let us contrast the first of these claims of Laming with that particular claim of Hills which we are now consider-

ing. Mr. Hills, in 1849, claims the application of hydrated oxide of iron, mixed or unmixed with sawdust, to be used conjointly with, or free from, other purifying materials at that time in use. He recommends the material to be damped and disposed in a dry-lime purifier. He describes processes for obtaining the hydrated oxide, but claims the use of the hydrated oxide, however obtained. Mr. Laming, in 1847, claims the application of carbonate of iron, mixed or unmixed with sawdust, to be used conjointly with, or free from, other purifying materials at that time in use. He recommends the material to be damped and disposed in a dry-lime purifier. He describes processes for obtaining the carbonate, but claims the use of the carbonate, however obtained. Now, it so happens that there are two substances called by the name "carbonate of iron"—a substance properly so called, and a substance generally so called, which last is no other than hydrated oxide of iron. It is maintained, and not unreasonably maintained, that Mr. Laming, as a patentee, must be held to have called things by their right names, and by carbonate of iron to have meant carbonate of iron, unless clear proof to the contrary can be adduced; but, admitting that the substance which Laming calls carbonate of iron is identical with the substance which Hills more properly calls hydrated oxide,—that by the term carbonate of iron, Laming meant the substance popularly known by that name, described by that name in the *Pharmacopœias*, and dispensed by that name in chemists' shops,—what then becomes of Hills' patent? Now, that he did so use the term appears evident from the following considerations. The true artificial carbonate of iron is a mere chemical curiosity. It can scarcely be procured by the analytical chemist, and cannot possibly be obtained in the dry state as an article of commerce or manufacture. No sooner is it exposed to the air than it becomes converted into the hydrated oxide. Graham says, "Carbonate of iron is obtained on adding carbonate of soda to the proto-sulphate of iron, which may be washed and preserved in a humid condition in a close vessel, but cannot be dried without losing carbonic acid and becoming sesqui-oxide of iron." Gmelin, speaking of carbonate of iron prepared with every precaution to prevent oxidization, says: "The moist powder becomes perfectly dry after exposure to the air for same days, giving off its carbonic acid, and being *completely* converted into ferric oxide," *i. e.*, peroxide of iron. Brande, speaking of carbonate of iron, says: "When air is not excluded, the white precipitate presently passes through various shades of green, and if exposed to air becomes brown, losing carbonic acid, and passing into hydrated peroxide;" and in another place he says, "The precipitate obtained by the decomposition of proto-sulphate of iron by carbonate of soda, washed and dried, was formerly known in pharmacy under the name carbonate of iron; but, as above stated, it becomes peroxide by exposure, retaining, however, according to Soubeiran, a little carbonic acid." Phillips says of sesqui-oxide of iron, "The formation of carbonate of iron is the first step in the process; during the washing, which is necessary to get rid of the sulphate of soda, and especially by the subsequent exposure to the air whilst drying, the protoxide of iron loses its carbonic acid, acquires half an equivalent of oxygen, and thus become sesqui-oxide of iron. It is prepared nearly in the same mode as what was called sub-carbonate of iron in the *Pharmacopœias* of 1809 and 1824, which usually was, what it is now termed, merely sesqui-oxide of iron," *i. e.*, peroxide of iron. It is mentioned specifically by Brande, and admitted by all chemists, that the peroxide of iron resulting from the simple exposure of the carbonate, must be in the hydrated, and not in the anhydrous state. Thus Dr. Taylor, the plaintiff's principal scientific witness, when asked by Baron Bramwell—"Was hydrated oxide of iron formerly called carbonate of iron in the *Pharmacopœias?*" replied—"Yes, and in medical prescriptions." Again, in answer to a question from Mr. Bovill, Dr. Taylor said: "Carbonate of iron, unless kept from the air, very rapidly becomes hydrated oxide;" and he also said, in reply to a question from the Attorney-General, "The article sold as carbonate of iron in the druggists' shops twenty-two years ago was the precipitate of iron, which by washing had lost its carbonic acid and become hydrated oxide." That Mr. Laming intended his so-called carbonate of iron to be washed, dried, and exposed to the air, will speedily be evident. Carbonate of iron, then, as is apparent from the above observations, was, and is still, the name generally employed by medical men, of whom Mr. Laming is one, to express the hydrated oxide of iron. In a former edition of the *Edinburgh Pharmacopœia*, the common rust of iron—a hydrated oxide that never had been a carbonate—was described under the name carbonate of iron. In the *London Pharmacopœia*, up to the year 1836, a process was described for making carbonate of iron, and though in one stage of that process the product was a real carbonate of iron, the final product of the operation, the substance which was to be obtained and dispensed under the name of carbonate of iron, was not carbonate of iron at all, but hydrated peroxide of iron; and the very process which was then used to make the substance, miscalled carbonate of iron, is now used to make the same substance under its more proper name of sesqui-oxide of iron. At the present time, in the best druggists' shops, such as those of the Apothecaries' Company, Jacob Bell, Peter Squire, &c., where *pharmacopœial* processes are strictly adhered to, they sell and dispense the nearly pure hydrated oxide of iron under the name of carbonate of iron. But in inferior shops, where they do not follow the *pharmacopœial* process, they substitute an anhydrous oxide made at a red heat, and at many shops they sell a mixture of the two varieties, hydrated and anhydrous. But, as observed by Baron Bramwell, the meaning of the phrase carbonate of iron, is, after all, not very important, inasmuch as Mr. Laming describes a process for obtaining the stuff that he calls carbonate of iron, which process would necessarily yield not a strict carbonate of iron, but a hydrated oxide of iron. He takes gas liquor, which, freed or not from its hydro-sulphuret, contains carbonate of ammonia, and precipitates its carbonic acid by means of sulphate or muriate of iron. He thereby gets carbonate of iron, which he washes to remove the valuable sulphate or muriate of ammonia adhering to it, for he expressly alludes to the preparation of his stuff in an economical manner. He dries his stuff, for otherwise he would never have occasion to damp it as he expressly enjoins, nor ever be able to use it in a dry-lime purifier as he particularly describes. He exposes his stuff to the air by mixing it with sawdust, and his resultant product necessarily is, not carbonate of iron, which he calls it, but hydrated oxide of iron, which Mr. Hills calls it. Moreover, among the many processes described by Hills for making hydrated oxide of iron, there is one identical with this process of Laming for making the so-called carbonate of iron; which process Mr. Hills has not only described, but has acknowledged to having actually employed for the purposes of his patent. By the action of hydro-sulphuret of ammonia or gas liquor upon sulphate or muriate of iron, he has obtained an impure carbonate of iron, which by washing and drying became a hydrated oxide, exactly as described, though not explained by Laming two years previously. No one can doubt also that by soda and potash Mr. Hills meant the carbonated, and not the caustic alkalies, and that by their use he produced a strict carbonate of iron, which eventually became a hydrated oxide; for why should a man of his intelligence use an expensive substance like caustic soda, to produce identically the same result which a cheap substance, like carbonate of soda, would produce in identically the same manner? for, whether caustic soda or carbonate of soda were employed, the original precipitate would require exposure to air to become hydrated peroxide of iron. We know that the carbonates of soda and potash were called soda and potash (pot ashes) long before the hydrates of soda and potash had ever been heard of, and even at the present day it is no more scientifically correct to call caustic soda, or hydrate of soda, soda, than it is to call carbonate of soda, soda, as is the habit of most unscientific people. But it is alleged that Mr. Laming, by the term carbonate of iron, could not have meant hydrated oxide of iron, because he claims to use the carbonate of iron alone, and, in another part of his patent, he disclaims the use of oxide of iron, save when mixed with other materials. If the validity of Laming's patent were in question, this objection might have some point, but, in reference to the mere publication of the use of a certain material, it can have no force whatever. Mr. Laming might not have understood his own process, or he might have cunningly described it so as to avoid Croll's patent. But the discrepancy is easily explained. In some pharmaceutical works, more particularly in the *Edinburgh Pharmacopœia*, the hydrated oxide of iron was called by the name carbonate, and the anhydrous variety alone called by the name oxide or sesqui-oxide. Now, in the paragraph where Mr. Laming disclaims the use of oxide of iron *simpliciter*, he alludes to heating the material to near redness, whereby it would become anhydrous or nearly so. Thus, two years previous to Hills' patent, Mr. Laming published a claim to the

use of hydrated oxide of iron, mixed or unmixed, and to the use of the anhydrous oxide only when in a mixed condition. Whether or not he was entitled to these claims has nothing whatever to do with the question of prior publication.

Fifthly, Mr. Laming, in another part of his patent, claims especially the use of hydrated oxide of iron mixed with chloride of calcium. He makes this claim in rather ambiguous language, and it was somewhat unfortunate, we conceive, for the London Gas Company that the attention of judge and jury was directed more prominently to this section of his patent than to that relating to the so-called carbonate of iron. He says: "Chloride of calcium is both abundant and cheap; under certain circumstances, however, it may be desirable to make it, for the purpose of gas-purifying, by decomposing muriates of iron, &c., by means of lime. In such cases, the oxides or carbonates which result are useful for the said purification, and need not be removed." He does not claim the process of making the mixture, but merely the use of the mixture when made. Of the two substances in this mixture, the hydrated oxide of iron alone is useful for removing sulphuretted hydrogen, the chloride of calcium serving only to remove carbonate of ammonia. Now, one of the methods described by Hills for making his hydrated oxide of iron is by decomposing muriate of iron by means of lime, and doubtless he and Laming both proposed to mix the ingredients in the same equivalent proportions; though, as Mr. Hills disclaims the use of the resulting chloride of calcium mixed with oxide of iron, we can only infer that he intended subsequently to separate it from the oxide of iron simultaneously produced in this method of manufacture. But inasmuch as he proposes to use his oxide of iron mixed with many salts analogous to chloride of calcium, and serving the same purpose as chloride of calcium, namely, that of removing carbonate of ammonia, it becomes a question whether or not he discarded the chloride of calcium to make a colourable difference between his patent and that of Laming, or whether he discarded it from some inapplicability pertaining to it. It is observable that Mr. Hills claims the use of mixtures of oxide of iron with every other fixed salt than chloride of calcium, which could possibly result from the processes he describes for making oxides of iron, even when these salts, as is the case with the muriates and sulphates of potash and soda, could exert no appreciable purifying action on the gas. But he says that he disclaims the chloride of calcium, not because it was useless, but because it was positively disadvantageous by reason of its deliquescent, slimy character. This statement, indeed, does not quite accord with the experience of those who have used this portion of Laming's patent, and there was very considerable evidence of use adduced; but it is altogether inconsistent with Mr. Hills' claim to a mixture of oxide of iron with chloride of magnesium, or muriate of magnesia—a substance more deliquescent and slimy than even chloride of calcium. It was, therefore, a question for the jury to decide, whether the use of a mixture of chloride of magnesium and hydrated oxide of iron, damped and mixed with sawdust, was or was not a mere colourable difference from a mixture of chloride of calcium and hydrated oxide of iron damped and mixed with sawdust, seeing that the oxide of iron was in each case the only efficient agent for removing the sulphuretted hydrogen, and that the chlorides of calcium and magnesium were both slimy, deliquescent substances, useful for one and the same purpose, but having nothing whatever to do with the subject under dispute, namely, the removal of sulphuretted hydrogen. But the jury decided this, as indeed every other point, in favour of the plaintiff.

We must defer the consideration of Mr. Hills' claim to the process of revivification to a subsequent number, if, indeed, it be worth while discussing the subject at all further.

Correspondence.

THE SWALLOW'S HOME.

SIR,—I observed in your last JOURNAL a few remarks on a pair of swallows building their nest at the Preston Gas-Works. Allow me to inform you that the circumstance is not a rare one; we have a considerable number every year, but this year I have taken the number of nests reared, and the following is the result of my observation:—Just over our purifiers there have been six nests of young swallows reared; in the lime-house there have been twenty-four nests; and in the coke-shed two nests. Each of those nests averages five swallows, so that we have something like two hundred swallows about the gas-works at present.

PETER SIMPSON, Manager.

Gas-Works, Rugby, Aug. 26, 1858.

Register of New Patents.

280.—JOHN M'DERMID and JOSEPH M'DERMID, both of Oak Tree, Middle-one-Row, near Darlington, in the co. of Durham, for "*An improved apparatus or contrivance for supplying water to buildings and dwelling-houses for sanitary purposes and for the extinction of fire.*" Feb. 15, 1858. Provisional protection only obtained.

This invention comprises the undermentioned improvements, which may be used either separately from each other or in any combination, as may be desired—that is to say, it is proposed to retain the rain-water falling upon the tops of houses and buildings in cisterns or reservoirs resting upon the front and back walls, and upon other parts of the roof if deemed requisite, so as to obtain a supply of water direct from the clouds, and free from the contamination of the ordinary channels employed for the conveying it to pumps, &c., &c. And in order to render such water more pure and fit for family use, so much of it as may be required is passed through one or more filters into a cistern situated in one of the uppermost rooms or other convenient place, from which, by means of pipes and taps, it may be conducted to any desired room or portion of the house. In order to prevent or lessen contamination from smoke or soot, it is proposed to employ tubes of sheet iron, passing along the tops of the houses and formed so that the underpart may fit like saddles across them, such tubes communicating with one or more of the chimney-shafts, of sufficient dimensions to convey away the smoke and vitiated air, and also any other noxious vapours, as it is also further intended to connect the tops of the drains with the said tubes by pipes passing down the outside of the houses from the said tubes to the drains. And in some cases it may be desirable to employ a smoke-jack or fan driven by steam or wind, or otherwise, to create or increase the velocity of the desired current. And it is also intended to furnish or fit up the said houses or buildings with pipes from the bottoms of the before-mentioned reservoirs, descending to the top of the doors or other convenient positions, and with tubes or hose, which may be screwed on to the lower end of such pipes, so as to extend the water supply to any parts of the said house or building, and rendering the same available for the purpose of extinguishing fire, if and when required.

325.—WILLIAM CLARK, of 53, Chancery Lane, in the co. of Middlesex, engineer and patent agent, for "*Improvements in filtering water, and in apparatus for the same.*" Patent dated Feb. 19, 1858.

This invention relates to a continuous pressure-filter for filtering large quantities of water very rapidly (the filter being but of small size) by means of pressure obtained either from a lift-and-force pump, or from a reservoir having a sufficient head of water.

The filtering material in this apparatus consists only of very fine sand, which is compressed in each filtering cylinder or chamber by means of diaphragms, which may be raised or lowered at will, thus replacing with advantage the porous stone hitherto employed for filtering purposes, the sand having none of the inconveniences attending the stone, as the salts of lime do not adhere to it and form a solid body, as they do with porous stone.

The claim is for—

1. A continuous filter arranged and acting by means of pressure, as hereinbefore described; and also certain modifications of the same.

2. The application to filters of fine sand in a compressed state, as a substitute for the porous stone hitherto used.

328.—THOMAS METCALF, of Newton Heath, Manchester, in the co. of Lancaster, manufacturing chemist, for "*Improvements in the purification of crude tar oil, rendering the same suitable for lubricating machinery and other similar purposes.*" Feb. 20, 1858. Provisional protection only obtained.

This invention consists in separating the light hydro-carbons and black carbonaceous particles from the crude tar oil, thus rendering it, when so purified, fit for lubricating machinery and similar purposes. This object is accomplished by a distillation and digestion of the crude tar oil with the siliceous earths, lime, alkalies, and mineral or vegetable acids, combined or separate.

334.—WILLIAM GREENE, of 21, Merlin's Place, Clerkenwell, London, house decorator, and MATTHEW CHARLES GREENE, of 19, Hatton Garden, London, wholesale optician, for "*Improvements in joining soft metal pipes.*" Provisional protection only obtained.

This invention consists of a method of joining or coupling two parts of soft metal pipes together, and may be used either instead of soldering or in lieu of the ordinary screw-coupling used for such pipes.

The method applies only to lead pipes, and to the tin or soft metal pipes used for gas, which are joined in the following manner:—A flange is thrown out on each of the ends of the pipe to be joined—that is to say, the flanges are hammered or pressed out, or otherwise formed from the solid metal of the pipes. The two flanges thus formed are brought together, and a part of a screw-coupling placed on each (the one male and the other female). The female receives the two flanges, or screws on to the male, thereby binding the two flanges, and joining the two parts of the pipe firmly together. The two screwed parts are both placed loose on the pipes, and are each furnished with suitable parts for the application of wrenches, or other means of gripping them may be contrived.

350.—WILLIAM JOHNSTON, of Glasgow, in the co. of Lanark, N. B., merchant, for "*Improvements in apparatus for regulating or controlling the flow or passage of fluids.*" Patent dated Feb. 23, 1858.

This invention relates to the arrangement and construction of valvular contrivances of the flexible partition class. In one modification under which the invention may be practically carried out, the body of the valve or controlling apparatus consists of a main tubular shell somewhat resembling a common stop-cock. This shell is formed interiorly with two separate and distinct sections of fluid passage-ways. These two sections are divided by a partition at a part of the shell which is surmounted on its upper side by a horizontal disc-face-piece of large diameter. In the centre of this disc-face there is an elevated annular disc working-face, the aperture in which forms the fluid-way from the inlet portion or section of the main shell, this opening being between the interior partition and the entering end of the main shell. Immediately outside the elevated annular

working-face there is a second opening in the disc, forming a thoroughfare into the outlet section of the main shell, this opening being to the front of the interior partition. Upon the outer portion of the large disc-face there is fitted a cupped piece of any suitable flexible material—as caoutchouc, for example—having a circumferential flange, by which it rests on the disc-face. The concavity or recess in this cupped flexible piece or partition thus embraces or covers both the openings hereinbefore described—that is to say, both that in the elevated annular face and that through the disc external to the annular face. This flexible cup thus forms the means of communication between the two passages in the main shell. Over the flexible cup there is, screwed down to the disc-flange, a correspondingly cupped or concave cover-piece of metal, bored through its centre, to receive the upper spindle or tail-piece of a vertically-acting presser-piece of metal, the lower end of which is formed to bear upon the convex top of the flexible cup. The cover is also formed with a pair of parallel pillars, to carry the working stud of an acting eccentric for working the valve or stop-cock. This eccentric is so centred upon its stud that, when its handle is turned over to one side so as to be horizontal, its greatest line or extent of eccentricity is downwards, thus pressing down the internal presser-piece before described. This downward pressure forces down the flexible cup upon the elevated annular face upon the disc beneath, and shuts off all communication between the two sections of the main shell, stopping the flow through of any fluid. When the handle is turned over to the other side, the eccentric releases the flexible cup, and the top of the latter rises, thus opening up the thoroughfare. The working handle is marked "open" and "shut" on opposite sides, so that one of these words only can be read at once, such word indicating clearly the condition of the parts. The flexible cup-piece can be actuated in various other ways with a similar result. When a lever handle is used as hereinbefore described, the parts may be so arranged that when the handle is vertical the valve shall be closed, and when put down to either side it shall be opened, or *vice versâ*.

The claim is—

1. The general arrangement or combination of each modification of apparatus for regulating or controlling the flow or passage of fluids hereinbefore described.

2. The application or use in apparatus for regulating or controlling the flow or passage of fluids of a flexible cupped piece, such as is hereinbefore described, and which directly controls the entire flow, and is depressed against the fluid pressure in closing the apparatus.

3. The application or use in apparatus for regulating or controlling the flow or passge of fluids of a flexible cupped partition, such as is hereinbefore described, combined with a loose presser-piece.

4. The application or use in apparatus for regulating or controlling the flow or passage of fluids, wherein the passage through is opened by the elasticity of the apparatus and pressure of the fluid, of an eccentric, with or without a loose presser-piece, acting on a flexible partition of a cupped or other suitable shape.

PROVISIONAL PROTECTION

HAS BEEN GRANTED FOR THE UNDERMENTIONED INVENTIONS.

1703.—William Edward Newton, of 66, Chancery Lane, London, civil engineer, for "*Improvements in gas-meters.*" July 28, 1858.

1755.—George Davies, of 1, Serle Street, Lincoln's Inn, London, and 28, Enoch Square, Glasgow, engineer and patent agent, for "*A process and apparatus for the extraction of oils for illuminating and lubricating purposes, and of carburetted hydrogen gas from the native bitumens of the West Indies.*" Aug. 3, 1858.

1791.—George Hinton Bovill, of Durnsford Lodge, Wimbledon, Surrey, for "*Improvements in the manufacture of gas; also in the manufacture of coke and other fuel.*" Aug. 6, 1858.

1793.—Charles Felton Kirkman, of Argyll Street, Regent Street, London, for "*An improved mode of treating sewerage for agricultural uses, and for machinery to be employed therein.*" Aug. 6, 1858.

1803.—John Taylor, of Roupell Park, Streatham Hill, Surrey, for "*Improvements in the manufacture of blocks for the construction of sewers and drains.*" Aug. 7, 1858.

1807.—John Gordon Picking and Thomas Paramore Purssglove, both of Battersea, Surrey, for "*An improved pressure-gauge for steam, gas, or other fluids.*" Aug. 9, 1858.

1821.—François Haeck, of Schaerbeck, near Brussels, Belgium, gentleman, for "*Improvements in the construction of cocks, taps, or valves.*" Aug. 10, 1858.

NOTICES HAVE BEEN GIVEN OF INTENTION TO PROCEED WITH THE UNDERMENTIONED INVENTIONS.

795.—Thomas Taylorson Topling, of Dunning Street, Bishopwearmouth, ironfounder, for "*Improvements in water-closets.*" April 13, 1858.

1598.—Alfred Hope John Bastable, of Belgrave Works, Ranelagh Road, Pimlico, London, for "*Improvements in apparatus employed in the production of light.*" July 15, 1858.

1639.—Richard Archibald Brooman, of 166, Fleet Street, London, patent agent, for "*Improvements in movable apparatus for receiving fecal and sewerage matters.*" July 20, 1858.

Legal Intelligence.

SURREY ASSIZES.

HILLS *v.* THE LONDON GAS COMPANY.

A full report of the proceedings in this case will be found in the Supplement issued with this day's Journal.

IN THE ARBITRATION OF THE GREAT CENTRAL GAS CONSUMERS' COMPANY AND MR. ALEXANDER ANGUS CROLL.

(*Continued from page* 474.)

Sixteenth Day.—Monday, Nov. 30, 1857.

Charles Pearson, Esq., examined by Mr. Lloyd.

I am the City solicitor, and have since 1818 turned my attention to the supply of gas in the City of London. In 1848 the matter assumed something of a tangible form, and it was at that time I became acquainted with Mr. Croll, and we exchanged our views on the subject of the supply of gas and the production of it; the result was, we became interested in the scheme for supplying gas to the City on a new principle. Mr. Croll proposed the formation of a company to carry out my plans by means of his patents, by which he told me that gas could be made at 6d. per 1000 feet cheaper than by any other known process. In consequence of what passed between us, Mr. Croll became the active promoter of a company for the purpose of supplying the City with gas, but not through the instrumentality of the Commissioners of Sewers, as I had proposed, and a bill was brought into Parliament in the session of 1849 for that purpose. I was present during the discussion before the committee in 1849, and both Mr. Croll and myself were examined. At that time Mr. Croll had made a tender to supply the company with gas at 1s. 4½d. at least equal in purity and illuminating power to the gas then in use in the City, and that fact was given in evidence by Mr. Croll and myself before the committee.

Mr. Lloyd: I will ask you, was that Mr. Croll's own suggestion, or was it the fact, as he stated, that he was wheedled into that tender?

Mr. Archibald: I do not think that is the right way of putting the question.

Mr. Lloyd: I am using Mr. Croll's own word in his own evidence.

Witness: For any gentleman to tax his memory ten years after to narrate facts and circumstances is always dangerous and difficult. I therefore have refreshed my memory by looking over a pamphlet published by Mr. Croll in November or December, 1849, which contains a compressed statement of the evidence given by Mr. Croll and myself before the committee. I have read this over, and this is a fair statement of the evidence given by myself and by him; and by these facts I am prepared now to pledge my oath to the truth. This was published by me and Mr. Croll in November or December, 1849, and formed the basis of the contract between the shareholders, the corporation, the Commissioners of Sewers, Mr. Croll, myself, and the consumers. At page 52 you will find a portion of Mr. Croll's evidence given on the 28th of March, which runs thus:—"He offered to manufacture gas for the company at that sum, that is, the 1s. 4½d.; and if they accepted his tender he should consider himself amply recompensed for the trouble he had undergone in this matter." I remember that evidence being given.

Mr. Lloyd: Are you able to say whether that was his own spontaneous offer, or whether it was an offer obtained from him by improper means?

Witness: At the time Mr. Croll made that tender, he and I had before us two statements as to the cost of gas, or rather, I should say, three statements as to the cost of gas; one was 20d. at the station-meter, which would be 2s. at the consumer's meter, which was the estimate that I had had presented to me, and which I had presented to the Commissioners of Sewers in my printed report. Mr. Croll informed me that he could make gas, or other persons could make gas, by the Scotch process of the clay retorts, at 1s. 4½d., and that he could make it by his patents, which combined the clay and the iron retorts; and he had patented an economical mode of purification; the combined action of those two patents would enable him to make gas at the cost of 10d. per 1000 feet. I doubted it, and he undertook to demonstrate that to me; and as far as a man unconnected with chemistry and with gas manufacture could be capable of receiving demonstration, he did demonstrate it to me. He took me to his works at Tottenham, and applied for the accounts of those works, of which he was the acting manager. They being aware of the object of it, refused to give him the last balance-sheet. I then purchased from him fifty shares to qualify me to accompany him as a shareholder to inspect the works. I was for several hours upon the works with him, examining the details of the manufacture, and that investigation ended in my perfect conviction that, by means of his patents, he could manufacture the gas at 10d. per 1000. The facts connected with that establishment were reduced into writing and published, and he gave in evidence before the committee of the House of Commons the facts. [A tabular statement was handed to the witness.] This tabular statement is substantially, if not identically, the same with that which was produced before the House of Commons by Mr. Croll. It was published by him with my knowledge and the authority of the board. It was published sometime in the course of the year 1849; but this particular one that I have now in my hand, I have reason to believe was printed and circulated about the 3rd of December, 1849. It was printed and circulated with this pamphlet, to which my evidence has already referred. The two were sent together by Mr. Croll, and by myself a copy to each member of the Common Council, to each member of the Commissioners of Sewers, to the persons who had become shareholders, or had become contractors for consumption, together with other persons in the City whom we thought likely to become so, and who we thought would be attracted to join the company by the publication of this tabulated statement and this book, both of which I believe to be true. He and I went through it; it is extracted from the Journal of Gas Lighting; and we went through that, and examined it, to see that it was correct. There is appended to this pamphlet a copy of the petition to the Commissioners of Sewers, which petition was signed very numerously, in accordance with the wishes of myself and Mr. Croll and the company, for the purpose of making an impression on the Commissioners of Sewers; I attended the Commissioners of Sewers with this in my hand and Mr. Croll by my side. I quoted from it, I argued from it; and, in pursuance of this, we induced the Commissioners of Sewers to agree to the streets being pulled up and the pipes laid down, on the representations contained in this pamphlet—I, honestly believing in it, boldly arguing upon it, and Mr. Croll by my side. We both exerted ourselves till the company was formed, and afterwards. Mr. Croll's intelligence, great zeal, and courage cannot by any expression of language be overrated; I did my best, but certainly, in those qualities, I have no hesitation in saying that Mr. Croll surpassed me. And ultimately the bill was passed into a law, the company having been previously established under the Joint-Stock Registration Act. I sent in my resignation as a director in the month of December, 1849. I was at that time the City solicitor, which takes up seven or eight hours a day of my time; and I was a member of Parliament for a metropolitan borough, which is no slight duty; and I had actively engaged in this to the injury of my health. Prostration of mind and body seemed approaching, and my medical man told me that I must relieve myself from some of these onerous engagements; I therefore announced to the public my retirement as a director of this company. At the end of December, at a large meeting at the London Tavern, I was called on by the united voices of my fellow-citizens to continue my services, and at several wardmotes of the City a similar request was preferred. That was on the 21st of December. In consequence of that, I agreed to hold on till my successor should be appointed, and then become an honorary director, with occasional attendance at the board. Early in the month of February, 1850, I insisted upon my retirement, and that my resignation should be accepted. I think it was the 13th of February when my resignation was accepted. I hold in my hand a copy of the resolution

passed upon that occasion by the board, at which Mr. Croll was present; and I mention this because I perceive by the newspapers that I am represented to have acted towards Mr. Croll as a despot. This is a resolution in which my kindly habits and manners, which those who know me, I believe, know belong to me, are fully recognized and acknowledged, and by no one more than by Mr. Croll:—

Extract from General Board Minutes, Feb. 19, 1850, *Book I., Page* 143.

The chairman wished again to impress on the board the absolute necessity of his retirement from this office. That whatever occurred his heart was with the company, and he should at all times feel it both a pleasure and a duty to give his advice and assistance; but he urged that his resignation should be accepted in accordance with an intimation he had publicly given.

Resolved,—"That the resignation be accepted, and that whilst the members of the board recognize with regret the necessity under which their friend, Mr. Pearson, has acted, they wish most emphatically to place on their minutes a record of their sense of the value of his labours, which have been at all times available for the furtherance of the objects of this company.

"And when they consider that this exercise of his acknowledged powers and the devotion of professional skill have subjected him to ungenerous observations and personal annoyance, they feel convinced he will be compensated by a knowledge that the citizens of London will ever remember with gratitude the successful efforts which have mainly contributed to break up a monopoly under which they long suffered, and thereby effected a present saving to them of £50,000 per annum.

"And whilst thus recording their sense of his public services, they beg to tender him their warmest acknowledgments for his courteous behaviour to them at all times, and to assure him that, in reviewing the eventful struggle of the last year, the hours of labour and anxiety will ever be associated in their mind with his gallant and manly bearing as their leader, and his disinterested and kindly character as their friend."

Feb. 19, 1850, *Book I., Page* 145.

The deputy-chairman read an address to Charles Pearson, Esq., M.P., which he had prepared as a testimonial of the esteem in which the directors held his services as their late chairman.

Resolved,—"That the same having been entered on the minutes, a copy thereof be sent to Mr. Pearson." Also

Resolved,—"That the board of directors will be at all times gratified by the attendance of Mr. Pearson at the meetings whenever it may suit his convenience to be present, in order to avail themselves of his counsel and advice, and that the secretary be instructed to apprise him of such meetings."

Extracted Nov. 7, 1857.

After my resignation was accepted I was thrown on a bed of sickness, a broken-down man, in constitution, mind, and body. I may speak it in honour of Mr. Croll, that, while I was in that state, he wrote me a letter (which letter I shall produce), when he could not hope to have any further assistance from my services, which I believe no man could at that time. Mr. Croll did himself the honour to write to me this letter, if some gentleman will read it.

The Umpire read as follows:—

The Great Central Gas Consumers' Company, 48, *Moorgate Street, London, Feb.* 19, 1850.

My dear Sir,—As you have now retired from the direction of this company, I think it desirable that I should lose no time in expressing my willingness to enter into a legal agreement to fulfil the conditions proposed between us at the formation of the company, namely, that you should have one-third of the profits to be realized from the manufacture of the gas under my contract with the company, which, at 1s. 4½d. per 1000 cubic feet, I estimated would be 6d.; and also, in consequence of your requiring to devote a larger amount of time and energy than was expected would be required, to alter this arrangement so as to secure to you 2d. per 1000 upon all gas so made, and to furnish you quarterly with a faithful statement of the prime cost of such manufacture; and in the event of the profit exceeding 4d. per 1000 feet, you to have one-half of such surplus profit.

Mr. Gabriel informed me some months since that he had the necessary deed prepared by his solicitor to carry out this arrangement. If, therefore, you will let me know when it will be convenient for you to complete it, I will have great pleasure in assigning to you this right, as some compensation for the valuable services you have rendered me in prosecuting this great public undertaking.—I am, my dear Sir, very faithfully yours,

Charles Pearson, Esq. (Signed) A. Angus Croll.

Witness: I had been seized with shivering, with confusion, and determination of blood to the head, and it was supposed in the City that I was a beaten-down man, and that time Mr. Croll kindly selected to send me that letter. On my recovery, probably a month afterwards, I saw Mr. Croll, and I expressed the feelings natural to a man on such an occasion; but I then distinctly declined any partnership or any share of any surplus, and I stated that I would not accept of any engagement from him to receive the 2d. so long as I continued in any way connected with the company. He then implored me to render my assistance as I had done before to the company, though only as honorary director, expressing the same exaggerated opinions of my power and influence as I understand he has done before this arbitration—as to my being the company, the sole and whole mover of the company. I did not take any action whatever, or permit any person in my name, or for me, or in any way, to accept of any portion of the profits until the month of December following; and then, upon the 20th of December, the day before the anniversary of my having acceded to the request of the citizens to become an honorary director, I saw Mr. Croll, and had a long conference with him; and then I agreed to accept of the 2d. per 1000, on the express understanding that it should not be kept a secret, but should be publicly announced. I then wrote a letter in Mr. Croll's presence, and went with him to the board. I there announced to them, *viva voce*, the fact that I should accept the 2d. per 1000, and that I therefore could no longer attend their board. This is a copy of the letter.

Mr. Lloyd, at the request of witness, read the letter:—

To the Directors of the Great Central Gas Consumers' Company.

Gentlemen,—Early in the formation of the company, Mr. Croll generously offered to assign to me one-third of his interest in his patents for manufacturing and purifying gas. As the valuable processes patented by Mr. Croll are the creation of his own study and skill, and as my sole object in establishing the new gas company was to improve the quality and reduce the price of the gas supplied to my fellow-citizens, I felt I had no right to participate in his profits; I therefore declined his generous proposal.

In the month of February last, it pleased God, by a sudden prostration of both mind and body, to lay me on a bed of sickness, from which it was doubtful whether I should ever rise.

I am now 57 years of age, more than 30 of which have been spent amid labours, cares, and anxieties, personal, political, and official, that have produced more wear and tear of the human frame than falls to the lot of most men who have attained a greater age.

The retrospection of a past life, natural to a bed of sickness, brought out before my mind in vivid characters the reflection that I was scarcely justified in sacrificing the remainder of my life and health, if I should again be raised up, for the selfish gratification of a vain desire to retain a reputation for disinterested public service when I was conscious that I had failed to make provision for my family, or even for old age or incapacity for vigorous action, of the approach of which this, the first illness I ever had, seemed to be the precursor.

It is probable that the same thought occurred to Mr. Croll's noble and generous mind, for, pending my illness, he intimated his intention to assign to me or Mrs. Pearson the profits of one-third of his patent rights in the City.

I consulted with a gentleman of high rank and character in my profession, who has been intimately acquainted with my family for 30 years, and I have acted in accordance with his judgment.

I have accepted Mr. Croll's noble gift, to be assigned to trustees for the benefit of Mrs. Pearson and myself, upon the distinct understanding that I shall be at liberty to publicly announce the fact.

I think it right to communicate the circumstance to the board of directors in the first instance.

To-morrow is the anniversary of the day when my fellow-citizens in most of the wardmotes of the City were pleased so handsomely to acknowledge my services in promoting the triumphant success to which your company have now attained. Under favour of your resolution, I have had much pleasure in co-operating with the board during the last year; I now feel that my position, as having an interest, however distant, in Mr. Croll's arrangements with the company, would fetter my independence in the discussion of any matter in which his interests are involved. I therefore feel it necessary to discontinue my regular attendance at the board.

I need hardly say that my desire to advance the interests of the company, and my earnest wish to cultivate the friendship and goodwill of all the members of the board, remain undiminished; and I shall hold myself at all times ready to obey any special summons you may send, whenever you may think that my advice or services can be made available for the benefit of the company.—I have the honour to be, Gentlemen, your most obedient servant,

10, *Park Street, Westminster, Dec.* 20, 1850. (Signed) Charles Pearson.

Examination resumed: I did attend whenever matters were to be discussed for winding up old matters connected with outstanding arrangements during my time, provided it did not relate to matters between Mr. Croll and the board. On all occasions when I either knew beforehand, or discovered pending the sitting of the board, that any question had arisen or was likely to arise, in which their interests or feelings were adverse, I either abstained from going, or I retired from the board. Subject to this, I remained in attendance on the board, but less and less frequent, until the month of April, 1852, when, in consequence of differences between the members of the board and Mr. Croll (I being on terms of great intimacy with them at the board), my peace of mind required that I should abstain from going there, and from that time, 1852, down to 1857, I think, in the six years I was twelve times at the board, and I think I may say not more than twelve times. I scarcely ever spoke on the subject to either of the directors; I abstained entirely; when we did it was painful to me. I took Mr. Croll's part in discussion with them, and I took their part in discussion with Mr. Croll. The consequence of that was, there was growing up a coolness and a shyness towards me. My son-in-law and I living in one house, we found it necessary to taboo that subject, and we never spoke of it.

Mr. Lloyd: I must put it pointedly to you. During either of the years 1850, 1851, 1852, or 1853, did Mr. Croll ever state to you that he had any claim on the company for engineering charges, or in respect to services rendered by him in the formation and the establishment of the company?

Witness: To the best of my belief he never did, but we were in the habit of dining together two or three times a week, and having frequent conversations; and if the learned counsel on the other side can call my attention to any fact, by-and-bye, which it is possible may bring to my recollection some conversations leading that way, I will admit it; but certainly I have not the slightest recollection of it, and I do not believe it took place. I think it could not be so, as well as I think it was not so, because I know there were deeds which I prepared or settled which clearly would have protected the shareholders of the company, as it appears to me, from any such claim; therefore I say that I believe Mr. Croll did not. That is from memory; and I believe he could not, because that would have received such an answer from me; but that is opinion. I never mentioned to Mr. Dakin, the chairman, or the deputy-chairman, or any other director, the fact that Mr. Croll had mentioned he had claims upon the company for those early services, unless it was after the years 1854 or 1855, and I do not think that I ever did in those years; in fact, I am confident that I never did. I am not so confident that Mr. Croll, in 1855, did not suggest to me that, as an evidence of the ill-treatment he was receiving from the directors, he had not received any money for his evidence in Parliament. I think it not improbable that he did; I am impressed with the opinion that he did, but it was rather as an evidence of the ill-treatment by them than as the foundation of any pecuniary claim; and I am led to that belief by the fact that I understood Mr. Croll attributed it to a time when coal was dear. I do recollect a complaint made to me of Mr. Croll's losing money at the time coal was dear in 1854—at the time of the Crimean war—and he then complained that he was losing money; and, amongst his charge of grievances against the company, I think it not improbable that he did, as one of those grievances, say that he had never received anything for his evidence that he gave before the committee of the House of Commons, and in Tallis's matter, and matters of that kind. I believe I said these were affairs for the attorney. I remember the time when the alteration was made as to the mode of estimating the quantity of gas manufactured for which Mr. Croll was to be paid. The discussion first took place between Mr. Croll and myself, I think in the autumn of 1850, when we were approaching the period for the supply to commence; and one of the directors of the company, from information he had received from the manager of the gas-works at Newark, suggested that, although we had agreed for price, yet we had agreed to buy an article variable in bulk and quantity, and there ought to be some mode settled by which the temperature of the gas could be ascertained at the time of its measurement. I, understanding very little on the subject, conferred, as I always did, with Mr. Croll: the directors conferred with Dr. Leeson. We went down to the works and examined the station-meter, and then considered by what machinery we could ascertain the temperature so as to satisfy both parties. Dr. Leeson had given us some advice, which appeared to us so complicated and so expensive, that it was suggested some mode might be arranged by which the amount might be calculated at the consumer's meter instead of at the station-meter; and some time after, some agreement, I believe, was founded on that. I know it is a fact, but I cannot bring to my mind the board-meeting at which that was done, though I fancy I was there; at least my name appears to have been there, but I do not recollect the circumstance. Sixteen and a half per cent. for leakage had been given in evidence by Mr. Croll, and was believed by him and myself to be a very large allowance, though the world at that time appeared to think it very small, by his cross-examination in committee; but he considered it a large allowance, excepting that he said, as the company would have to maintain a fighting trade with the other companies, that the frequent changes of services and of the fittings would lead to escapes of gas, and therefore that he ought to have a larger allowance than the 16½ per cent. That was not at the time that contract was made; my impression is it was a good while before. I have a perfect recollection of his saying, as this was to be a fighting company, 16½ per cent. would not be a fair compensation. The tricks resorted to by consumers and others were the subject of conversation between Mr. Croll and myself. At that time he gave me a vast amount of information which I had not before, and which led me to think he ought to have a larger allowance.

Mr. Lloyd: That is all I ask Mr. Pearson; if there is anything else he wishes to explain, he can do so.

Cross-examined by Mr. Archibald: I do not recollect the report made

by Mr. Croll on the 12th of November, 1850, that he expected the leakage would be reduced to 10 per cent. Mr. Croll gave in evidence that at Nottingham the leakage was 11 per cent., and 16½ per cent. was a very large allowance.

By Mr. LLOYD: I do not remember, at the time that discussion was going on, anything being said by Mr. Croll about his being a loser by his contract, and he must do something to make it up. I had no conception he was a loser by his contract.

Mr. ARCHIBALD: You will find a minute of the 12th of November, 1850, in book 1. Mr. Croll's report having been read, a committee was appointed to examine into and communicate to the board thereon. The following is the report:—

Gentlemen,—I have the satisfaction to report that the leakage of the mains is now reduced to about 17 per cent. on the quantity supplied during the last week. Additional leakages are still found out and rectified; I therefore still entertain the hope that when the consumption has reached its maximum, the rental receivable by the company will be within 10 per cent. of the quantity of gas produced at the works.

Witness: I do not recollect that. If it is there I might have been present. It is not at all improbable. It would be in our minds at the time the matter was under discussion. I believed that 16½ per cent. was a large allowance for leakage, excepting as to the circumstance of its being a fighting company, and that it would depend on the violence with which it would be carried on as to the allowance. Mr. Croll told me that when the London Gas Company were fighting with the Chartered and other companies, their leakage was 35 per cent., and the reason why the engineers of those companies were not examined before the committee was, that Mr. Croll in his evidence said he would make the gas at 1s. 4½d., and they could not shake that evidence. What I understand by the term leakage is the unaccounted-for gas. Of course I did not understand that 20 per cent. to refer to stolen gas; that the company stole his gas, or wasted, or misapplied his gas. The impression of ours being a fighting company was produced in my mind by the information I received from Mr. Croll. I thought 20 per cent. a liberal allowance, but one which, under the circumstances, was fairly deserved by the peculiar position of the company, and I expected that Mr. Croll would get something by it. I am aware at this time that a very large number of services had been connected, and considerably more than have been laid since. I did not expect there would be any diminution from the 16½ per cent. I consider the margin between the 16½ and the 20 per cent. as intended to meet the contingencies to which a fighting company is liable. How much that would be I do not know, and cannot measure now. I considered it would be for the benefit of both parties. I believe the 16½ per cent. was a liberal allowance for leakage or unaccounted-for gas, and that adding 3½ per cent. to that would be sufficient, and more than sufficient, to cover the contingencies; and thinking it would be mutually beneficial, I supported it. In reference to the claim for services, I think it not unlikely that in 1855 I may have said that if Mr. Croll was losing money, as he alleged, I thought it ungenerous of the company if they did not pay him for Tallis's trial, and the services he had rendered in getting up the company. I am aware he was employed some time at the office arranging the staff of the company. He was for some months employed in that way, and I certainly did conceive, in 1855, that Mr. Croll was not generously treated by the company. I received this impression from Mr. Croll; and when with them I thought he treated them unfairly, which made an impression on me which led me anxiously to avoid any discussion on the subject. I think it not improbable, in some of the conversations which I had with Mr. Croll, I may have used expressions which led him to draw that conclusion. I said they ought to have paid him; that was my expression.

By Mr. LLOYD: For their retainer in Tallis's case, if it had been a claim made, that should have been made upon them. I am bound to say, in many of my conversations with Mr. Croll, I have led him to believe that I thought he was ill-treated during the years 1854 and 1855—that I thought he was not rightly treated by the company.

By Mr. ARCHIBALD: Not that he had a just claim for those services. I soothed his irritated mind by an expression of feeling that he had not been kindly treated. I do not recollect an account made for Mr. Croll by Mr. Marriott for services; but I recollect this, distinctly saying to Mr. Croll, in 1855—"If you have any claims upon the company, why do you not make them out specifically, and I will have great pleasure in trying to be a mediator between you and them; and I do believe we might find some of them that we might deal with, and others might go to a reference." There is a gentleman in this room that has heard me say that I most earnestly desire to avoid the consequences that flow from the increasing difficulties between Mr. Croll and the directors. I am exceedingly sorry that Mr. Croll did not permit me to do so. I never on any occasion advised him that he had better wait, and not press them for the present. I could not be so unjust a man as to desire to shove a claim from one body of shareholders on to another. On my oath, I never did. Up to 1851, I was in the habit of communicating with the board. In 1855 Mr. Croll called on me to ask me to see Mr. Dakin, for the purpose of wording a proposal that he had to make to Mr. Dakin, so as to lay it before the board. That was in April, 1855. Mr. Croll has given the document in evidence, I understand. I have a copy of it. Mr. Croll called on me, and said that he had had an interview with Mr. Dakin, and he desired me to popularize this document, to make it a paper that he could lay before the board, and, if necessary, lay before the public, to induce them to consent to pay 3d. per 1000 more for gas. I need hardly say it wants some exercise of ability to persuade people to pay more than by law they are bound to pay. Mr. Croll thought I was the man to do it; he brought me the paper which has been read to you. I went through it with Mr. Croll, and said to him—"Now, Mr. Croll, you say, having sustained considerable loss in manufacturing the gas required by the company, consequent on the increased price paid for coal, material, and labour, and the low price realized for coke; owing to the position of the works, and the high illuminating power of the gas supplied to your company, I am induced to submit the following proposition to your board." I took this book which I before referred to in my hand, and I went with the tabulated statement, and I said—"Now, Mr. Croll, tell me how the facts are; you say that the price of coal, labour, and so on, has increased?" Between our first and second interviews I had procured from an eminent coal factor an account of what the gas companies paid for coal, and I showed Mr. Croll; it was less than 16s. In his tabulated statement I think it was 14s. 10d., and I went through the whole of this; and I said to him, "If you can make good this statement, I am prepared to go with you to get an increased price; but you must make that statement in your own name; I cannot sustain you in it, from the information I have acquired." I used this expression, which, I dare say, will be remembered: I said, "Mr. Croll, if you are prepared to go before the public, and say that your calculations given in to the committee of the House of Commons were wrong, say so; you are not the first great man that has been obliged to do penance, and stand before the public in a white sheet. Say you have made a mistake, and that you are not to be ruined and the company destroyed because you have made a mistake. Show me that your calculations are wrong, and I am prepared to popularize a statement to induce the public to raise the price. I will not prostitute my pen by writing anything I have not an assurance is true." Mr. Croll, not for the first time, got angry with me, and made use of an expression, which I see he has referred to in his evidence, that, as he would not give me any more money, I would not act. Invert that proposition, and it is true; as I would not act, he would not give me any more money. I am not aware that Mr. Croll has made no profit. I am sure Mr. Croll has about £30,000 in his pocket from the profit of making gas. That is my belief, because Mr. Croll proved to my satisfaction that he could make gas at 10d. per 1000. When I say I believe, I am rather expressing myself too strongly, because the refusal of the new contractors to use Mr. Croll's patents led me to doubt whether he was accurate in supposing that they would effect the saving that he stated. The calculation which leads me to the conclusion of the profit made is, that Mr. Croll has been paid for all the gas he has made. If Mr. Croll's gas has been stolen, of course that makes a difference. I should state, in justice to Mr. Croll, that he has paid me 2d. per 1000 up to the month of March, I think, 1853. He brought me the bills, giving me the quantity of gas supplied, carrying it out at 2d., and either paying me by cash or bill. I did not ask Mr. Croll for bills, and I did not have them till he received the money. When I say that, I mean that Mr. Croll was considerably in advance to me. At the time our arrangement commenced I had become Mr. Croll's debtor; therefore, he had always a claim upon me. When he gave me bills or money, he gave me bills in reference to a quarter, we will say, part of which he had received, and part of which he had not received; but he gave me the bills to become due after the termination of the quarter when the money would have been received entirely by him. Instead of having, say half, in cash, Mr. Croll had received half in money and half he had not received, and I took a bill for the whole before all the money represented by the bills had become due; and I think it not unlikely, when he could not pay in money, I asked him for bills. The arrangement embodied in the letter of Feb. 19, 1850, had been discussed by us, but not entered into; Mr. Croll had repeatedly proposed to give me a deed. I had objected to receive a deed, so long as I remained connected with the company. I do not for a moment say I expected Mr. Croll would not do it; but all people do not do what they ought, and I was grateful to Mr. Croll for the generous part he took. The previous arrangement mentioned in the letter was this: Mr. Croll had proposed to my family (when my health was in a very precarious state, and without my knowledge) to prepare such a deed. Mr. Gabriel had spoken to his solicitor on the subject, and he spoke to me. When I heard of it, I refused it. Mr. Croll told me—and I know it is true—that Mrs. Pearson called on him about it. It was not because I did not deserve it that I refused it; but I refused to allow any deed to be entered into because I would not implicate myself, or Mr. Croll, or the company, so long as there were any relations subsisting between me and the company. I was entirely in his hands, and I viewed his letter as a high and noble act, when he thought I was not likely to live, that he was going to deal with my family as he would with me; and I have entertained the highest respect for Mr. Croll ever since. He originally proposed I should join a partnership with himself and another gentleman to supply the gas on his patents. I had agreed that, provided the Commissioners of Sewers or the corporation should lay down the pipes, I would do so. When the Commissioners of Sewers refused to bring in a manufacturing bill, I then entirely abandoned it. I gave Mr. Croll £100 towards the expenses in the event of its not going on, and I withdrew entirely from it. There was another proposal made to me by Mr. Croll for a division of profits, but at that time I had made it a distinct statement—"I will have no commercial liabilities." I said to Mr. Croll, "I will have no partnership; I will have an estimated third of the value of the patents." The letter referred, no doubt, to several previous discussions; the first was a negotiation that ended in November, 1849; the second was no negotiation, for I was no party to it; it was voluntarily a kind offer of Mr. Croll's, as I thought then; but as it appears now he thought he could procure my services by no other mode, that I utterly deny. The difference between this and former proposals is, he proposed to give me a fixed 2d. and a share of the profits after he had paid himself the 4d.; that is, assuming the profits from his patents are 6d. That is the construction I put on the letter. I answered him by saying, "I will not accept of that, but as soon as I cease to be connected with the company, if you make me the offer again, I will accept it." I did not communicate the previous discussions to the board until I communicated the subsequent arrangement. I stated that I did not know that Mr. Croll had a loss, but believed he had a large profit, which I afterwards qualified by saying that was speaking in the belief of Mr. Croll's statement being true; if Mr. Croll's calculations were unfounded, of course I do not know to what extent it may either have diminished his profits or made a loss. I do not know whether Mr. Gabriel, my son-in-law, went down to the works to examine the books after I received an account from Mr. Croll. [An account was handed to the witness.] I have seen the account; there is a loss stated at £7000. I think my son-in-law went before this. He did not go to examine the books with reference to an account. My request to the chairman and the deputy-chairman was, that they would go and examine Mr. Croll's books to see what was the actual state of the manufacturing account, because I said to them that I thought, having regard to Mr. Croll's position in creating the company, that if the fact was that he was not making a profit, it must end in disaster, and that they ought to go down and examine his accounts to see what the facts really were. Mr. Dakin peremptorily refused. He is an intimate friend of mine. I do not like to say that he could act unkindly at all. I thought he did not act kindly, and so I said to him, in not going to see the accounts. Mr. Dakin said—"A contract is a contract: if Mr. Croll cannot fulfil his contract, let him make a representation to the board to that effect I will have nothing to do with his accounts." I induced my son-in-law to go down, not with reference to this account, but with reference to my earnest wish that the board should inquire into the fact whether the gas could be made at 1s. 4½d., and whether Mr. Croll was winning or losing by it. I thought it was due to Mr. Croll. I learned from Mr. Croll that he was not manufacturing at a profit, but when he gave me the detail of his calculations by which he arrived at that result, the detail falsified the statement—I mean that the statement brought to me by Mr. Gabriel as to the items of charge in Mr. Croll's account, convinced me that the account was not a sound account. And when in 1855 Mr. Croll came to me I had this book before me, and I then cross-examined him as to the statement in regard to the cost of material and of labour, and of fire goods, and so on; and, coming to the conclusion that Mr. Croll was erroneous in his statement of facts, I drew the inference that there was no dependence to be placed on these calculations; and whether Mr. Croll states he has not the £30,000 in his pocket or not, my belief is, from his evidence before Parliament, that he has been making a profit, and that the statements there made by him are correct. I say, the

16s. for coal, the 10s. for coke, the price of labour, and the price of fire goods, according to inquiries I have made, are the proper prices. Mr. Croll has informed me that he was making gas at a loss. [A letter of the 2nd of September, 1853, from Mr. Croll, was handed to witness.] I do not recollect this, but I have no doubt that I received such a note, and an account. If Mr. Croll will give me a copy of it I shall be very much obliged to him. I have no such account, but very likely it is the one he sent me; I have no doubt. It looks to me like it, but figures you cannot bear in memory. If there is anything dependent on it, I will look into the figures and the items. I remember receiving an account with a letter of this kind, and I talked to Mr. Purves, I dare say, upon some of the facts contained in the account. Mr. Purves disputed some of Mr. Croll's calculations, and increased his amount of profit upon others.

Mr. ARCHIBALD read a letter from Mr. Croll to the witness, of the 16th December, 1851:—

Dear Sir,—The acceptance you obtained from me for £480 falls due on Saturday. How much can you let me have towards it? You must try and let me have the amount of the bill due by you, and in the hands of Mr. Hodge, as I must depend upon making up the amount from other resources than profit resulting from making gas at 1s. 4½d., with coke, &c., at present prices.

Witness: I think I had such a letter as that. I do not recollect it; but I think my letter was "with coke at 5s. 6d." That did not convey to my mind that Mr. Croll was not making a profit out of his contract. I am not aware that 2s. per 1000 feet was the original proposal of Mr. Croll. [A prospectus of the 3rd of March, 1849, was handed to witness.] I do not know the prospectus; I do not recognize the prospectus as my production. [The attention of the witness was directed to this passage:—

Mr. Croll, the promoter of this company, who has conducted and superintended the erection of many gas-works with great pecuniary advantage to himself and others, is prepared, when the Consumers' Company shall be incorporated, to contract for any number of years to manufacture for the company gas of a superior quality to that which is in common use for 2s. per 1000 cubic feet, and to give ample security besides his own to fulfil his contract:—

and he stated that he did not recollect it.]

Mr. ARCHIBALD: There is a note appended to that as follows:—

It is not proposed to enter into any engagements of this nature with Mr. Croll until the Act of Parliament shall have been obtained; but the company will have in their hands the power to effect arrangements by which, while the consumers exercise an efficient self-control in the government of their affairs, and obtain a steady profit for their capital, they may avoid the risk of manufacturing operations—always more economically conducted by individual enterprise than under a divided management. Mr. Croll does not require, though he is ready at any time to execute, a contract for any number of years to manufacture the gas for the company at 2s. per 1000.

Witness: I will not undertake to say I did not prepare that prospectus, but, as I have stated to you, before we went into the committee of the House of Commons (which was on the 25th of March, 1849), we had before us three figures for the cost of gas. The one was Mr. Croll's, at 10d.; the other was the Scotch system of clay retorts, at 16½d.; and the other was my estimate at 20d.; at least that was the estimate given to me. That 20d. at the station-meter makes 2s. at the consumer's meter. Therefore I said to Mr. Croll, "Make your tender; tender what you like so long as it maintains my statement to the Commissioners of Sewers, which is 2s." But I said, "Mind, tender what you like; you will have competition." Mr. Croll said, "Then I will tender at a price that I can beat my competitors," and he tendered then at 16½d. The 2s. was the price which I had communicated to the Commissioners of Sewers, and you will find in this book that, when I was asked by counsel whether the 16½d. was the price that Mr. Croll had given to me to give to the Commissioners of Sewers, or whether the 2s. was the price that he had given to me, my answer was—"That is a secret of Mr. Croll's; I do not feel myself at liberty to disclose what was the minimum price he gave me; there are gentlemen here who may be competitors with him; we have no contract with him, and therefore I do not think it fair to disclose it." I do not know that 2s. was the price at which Mr. Croll originally contemplated tendering. I know my suggestion was 2s., and Mr. Croll's suggestion was 1s. 4½d. I have no doubt I saw that prospectus. I have no minute of the different figures that I had in my mind at the time of the Act of Parliament. Mr. Croll gave me the 10d. and the 1s. 4½d. He gave me the 10d. as being the cost price, and it is so in his letter to me, because it is the 6d. which is the difference between 1s. 4d. and 10d.; 1s. 4½d. was the price at which Mr. Croll said that he would tender to supply the company. My calculation was 2s.; 1s. 8d. with the 4d. for leakage. I am not aware that the original tender was 2s., and then 1s. 6d. I have no recollection of any such chaffering or bating. My conviction is that I told Mr. Croll to make his own selection, but he would be put to competition; and therefore, to avoid competition, he took it at 1s. 4½d. I have no hesitation in saying that I do not believe Mr. Croll proposed 2s. I will not say that with respect to the 1s. 6d.; but what I distinctly stated at the time he made that tender, and at the time he gave evidence in the House of Commons, was, I distinctly swear that the 1s. 4½d. was named by him without wheedling on my part, and without despotism on my part—but his pure, free, and spontaneous act. The offer to supply gas at 2s. 6d., stated in my pamphlet to the commissioners, was made by Mr. Croll, and included the erection of the gas-works, which were to cost £60,000. You had better hear the explanation I gave at the time, because Mr. Croll was present, and published it. "He," that is, Mr. Pearson, "has said gas could be supplied to the corporation at 2s. 6d., so as to enable them to sell it at 4s. When he said 2s. 6d., he did not mean the gross price, but the net price—that is, at the burner, not at the gasholder; he meant, after the gas had been supplied and had passed through the meter, deduction also having been made for leakage. That is, the quantity of gas, as returned by the rental, would be less than 2s. 6d. That figure was more than Mr. Croll gave him, but he always liked to understate things in such matters. The contractor could only be paid for the gas actually registered, and would have to sustain all loss incurred through leakage. Mr. Croll might yet be in a position in which he might be required to tender for supplying gas, and he did not think it fair, therefore, to disclose the minimum price which he mentioned. Some of the gentlemen present might be his opponents." That was my reason before the committee why I would not mention the price at which Mr. Croll offered to make it, and Mr. Croll's evidence afterwards is, that 1s. 4½d. is what he tendered at, and that will be a full compensation for all his trouble and anxiety, if he can get it at that price. You will observe this, the sum given to me as being the cost of the manufactory at which the contractor was to make his gas was £60,000. Assuming that which all our calculations assume, that 300,000,000 was the supply, that gives on the £60,000 10 per cent., and £1500 for the cost of management, thus leaving the contractor 2s. at the burner net. That was the calculation I had received (before I knew Mr. Croll) from a gas manufacturer, and that was the price at which I believed the gas could be made; but Mr. Croll convinced me to the contrary, and he made his tender of his own free will. The letter of the 29th of April, 1852, was very likely produced at a meeting of the 27th of April, 1852. I wrote it at the instance of Mr. Croll, as also one on the 23rd.

The UMPIRE read the following extract:—

Fos. 62 and 63, Book III., Company's Minutes—April 27, 1852.

The chairman reported that he had had various interviews with Mr. Pearson and Mr. Croll on the subject of the contract, and that Mr. Croll would send in a fresh offer to supply the company with gas.

A letter from Mr. Croll, embracing the offer made by him on the 23rd instant, to supply the company with gas, was read by Mr. Pearson, and, subject to the following proposition, the paper was adopted:—

"That, in the event of the directors at any time requiring an alteration in the illuminating power of the gas, they shall have the power of so doing, and the illuminating power then, and in that case only, to be paid for absolutely at the rate of one halfpenny per candle per 1000 cubic feet beyond the standard of 9¼ sperm candles, burning 140 grains."

[The letter, which was read by Mr. Lloyd in the course of the first day's proceedings, was again read.]

Witness: I have no doubt that I wrote such a letter for Mr. Croll. The first sheet is, I think, in Mr. Massey's handwriting. There is writing of mine upon it. I see here is "certified by the referee." I see various alterations in my handwriting. No doubt it is a letter that I and Mr. Croll arranged together, and is, I presume, referred to in the minute of the 27th of April.

[The further cross-examination of witness was postponed.]

(To be continued.)

Miscellaneous News.

PHŒNIX GASLIGHT AND COKE COMPANY.

The Half-Yearly General Meeting of the Proprietors of this Company was held on Wednesday, the 18th inst., at the Bridge-House Hotel, Southwark—J. E. JOHNSON, Esq., in the chair.

The minutes of the last general court and also of the *pro formâ* half-yearly meeting having been read by the SECRETARY (Mr. Pridden), were approved, and the directors' report and accounts, which were published in the JOURNAL of the 3rd instant, were taken as read.

The CHAIRMAN said he had now to submit to the proprietors a resolution which was quite of a formal character, the adoption of which would not preclude any other proposition or the consideration of any question which the proprietors might wish to discuss on the present occasion; it was—"That the report of the court of directors and the accounts be received and entered upon the minutes." He had not many remarks to offer to them at this meeting, but those few he would, with their permission, make at once, as it would be in the hands of other gentlemen to submit the further propositions of the day. With regard to the accounts, which had been for some time before the proprietors, he would only remark that they were so similar to those of the last half year, both in amount and result, that it was not his intention to dwell upon them, excepting as to one or two particulars only. The gas rental amounted for the half year to 34s. 10d. per ton of coal consumed; for the last year it amounted to 35s. 1d. Although this result was a little against them, yet it was not entirely the result of waste; but the fact was, that having got their coal at a less cost, they had given a benefit to the consumers in the shape of a better quality of gas than heretofore. Their waste stood a little higher, but the case to which he referred was not the result of waste, but owing to the gas being made to the extent of 5 per cent. stronger and better. The difference in the price of other materials had been so slight as not to justify a reduction in the price of the gas; but taking the question of coal alone, they had felt warranted in giving the benefit to the consumers to the extent he stated in the improvement of the quality of the gas. That would account for the difference to which he had alluded; and although the returns were not quite so large, the cost of coal had not been so much per ton as before. The depreciation account stood as usual at 1 per cent. for the half year, but during the last half year they had expended double that amount—viz., £8000, chiefly in their works at Greenwich; besides which, several miles of new mains had been laid in Wandsworth and other outlying districts, which, from being thinly inhabited, had now become very populous, and therefore stood in need of a larger supply of gas, and the directors had not hesitated to incur this expense in order that there might not be any ground of complaint on the part of their customers. These were the principal subjects connected with the half year's operations to which he had to refer, and he would only add that he should be happy to answer any questions upon them which the proprietors might wish to make. The great point to which he desired to direct their attention on this occasion was the general state and position of the metropolitan gas companies. Since the last meeting of the proprietors some of the gas consumers of London had thought it right to go before the Secretary of State, and request a parliamentary investigation into the subject of the supply of gas to the metropolis generally. As soon as this movement came to the knowledge of the several gas companies, they requested to have an interview with the Secretary of State, which was most cheerfully and readily granted. They felt it their duty to say at once that they had not the least objection to offer against the proposed inquiry. They felt that their several works and proceedings were of that nature that could stand any amount of investigation. They said, "Go into any amount of investigation you please. If you find that we are wrong we will correct it; if not wrong, we shall expect to have the credit and consideration that we deserve." The result at the present moment was this: there were certain demands made by the representatives of the consumers—the first of which was, that the price of gas should not exceed a certain amount. Now, the principle universally recognized in all commercial matters was, that the price of an article must be regulated by the cost of the materials from which it is made. This great commercial principle regulated every other trade in the world, and he did not see why it should not be equally applicable to the manufacture and supply of gas. But of late years it had become the practice to insert in all Acts of Parliament relating to gas companies, a maximum price for the article which they supplied, and he (the chairman) had no objection at all to a maximum price being fixed, but then he said, let it be a reasonable one, something that would bear a little pressure in case of need, and one which had something like reason in it. On the other side, they said, "Make 4s. 6d. your maximum." He confessed that the members of this board (and he believed he expressed the sentiments of many other boards) thought it a little hard that the holders of gas property should be required to take as a maximum that price which in some companies was the lowest price they ever charged, and almost the lowest price that ever prevailed in London at any time. He should like to know what would be the case in the course of one week if, in case of war, the supply of coal by shipping were stopped, and they were dependent entirely upon the railways? The railways, if devoted to the coal-trade entirely, could scarcely bring the amount required; and in such a case the price of coal would be so enhanced as to put 4s. 6d. gas entirely out of

the question. He therefore felt that the maximum price ought to be such as to meet any extraordinary contingency of that kind that might arise, and he felt they had a perfect right to ask for it; because, when they had been under no such limitation, they had cheerfully taken 4s. 6d. for a long period, which, he submitted, was not more than a fairly remunerative amount. Something had been said about the committee of the House of Commons. It was one which was somewhat peculiarly constituted. The Secretary of State said it should be a fair committee, and in that respect he had fairly kept his promise. He stated that the consumers were an important body, and were entitled to be represented; therefore five members were chosen to represent the consumers upon the committee, five were appointed to represent the interests of the gas companies, and the same number was chosen on the part of the Government--intelligent and experienced men to act between the two interests involved. He (the chairman) did not think a fairer committee could have been chosen. That committee met two or three times, and examined a few witnesses, during which some amount of information, and, he might say, a vast amount of misinformation, was given, the whole of which could have been most easily answered and refuted; and he could not help thinking that, as far as the inquiry had gone, the impression upon the minds of the committee was rather favourable than otherwise to the companies, although not one witness had as yet been examined on their behalf. The inquiry had been postponed for an indefinite period, and whether the committee would be reappointed next session it was not in his power to say. All that he could say was, that he was firmly persuaded the gas companies had no objection whatever to the committee; they did not object to reasonable restrictions, and, as far as they were themselves concerned, those restrictions were already in operation on that side of the water. It was thought right that the quality of the gas should be tested by an officer independent of the company, and a person had been appointed for that purpose on behalf of the consumers, and reports as to the quality of the gas were regularly furnished. Therefore nothing further could be done as regarded the quality of the gas. As respected the measure of the gas, the public of course had a right to have the gas delivered and paid for by proper measure. Every consumer who was dissatisfied with his meter could have it inspected. If found to be of wrong action it was removed, and another meter substituted; if nothing was wrong, it was replaced. Those were fair and reasonable checks which they felt the consumers were entitled to, and they had been readily conceded by the directors. But all unreasonable checks upon their operations, or undue interference with their property, which prevented persons from embarking their capital in gas companies as an investment, the directors would certainly feel it their duty to resist. At present the inquiry had arrived at nothing that was tangible, or with which the companies could deal. All he could say was, that he believed the gas companies generally regarded this matter without the slightest possible apprehension, and he trusted that the same feeling would prevail amongst the proprietors. He hoped that they would not be intimidated by the report of any proceedings of the House of Commons' committee, and get rid of their shares with the idea, from any rumours, that in the result their interest would be depreciated, as he fully believed that any inquiry which could be made would not have the slightest effect upon the value of their property. With these remarks, he had pleasure in moving the resolution which he had already submitted.

Mr. WHEELER seconded the adoption of the report. He said that during a long life he had found, in reference to individuals and companies, that there were two very difficult situations in which they might be placed—one arising from the want of money, the other from having too much. This company had been, in years gone by, in the former position; he believed that their difficulty now was, that they had more money than they knew what to do with. Knowing, as he did, something of gas affairs, he did not see that there was any probability of any demand being made upon them for the large surplus they had in hand. That surplus had not been placed in a very genial soil, for they got little or no interest for it in Lombard Street. He found that a very large sum was annually written off from the profits for depreciation of property and investments—amounting to no less than £10,000 a year for the last three years. That might be perfectly proper; but the question was how long that course was to be continued? They had a larger stock of coal on hand than usual by about 4000 tons, and he had no doubt they were all paid for, and that they had very few debts to meet. Therefore he saw no chance of the £35,111 of surplus profits being ever called for. He would therefore very respectfully offer two suggestions with regard to the disposition of that surplus. One was that the amount of £2 per share should be returned to the shareholders, which would be a saving of interest to the amount of £1260. That would be one means of getting rid of that which he regarded as an inconvenience to the directors. He thought having too much money in hand was a temptation to extravagant expenditure, although he did not believe it would be so with their directors. The other plan he submitted was to divide the money by giving a bonus of £1 per share, not at the present moment, but say at the next meeting. This would relieve them of the difficulty which at present they experienced of having too much money in hand.

Mr. GRAY said he thought the plan suggested by the honourable proprietor was not likely to meet with the concurrence of the shareholders, because each person could calculate the interest of his money as well as his honourable friend. It had been recommended, in the first place, to reduce the capital by £2 per share, on which they were receiving interest at the rate of 7 per cent. He (Mr. Gray) ventured to say the meeting would not support such a proposition as that. Mr. Wheeler, by the course he had proposed, insinuated that the collection of £2 was unnecessary. He ventured to say that if the call had not been made, the company would have been almost at a standstill for want of money. With respect to the dividend, he had for some time past expressed his opinion that a larger sum was reserved than the circumstances of the company called for. He still entertained the same opinion; for, whilst they had an increase in the rental, the shareholders did not benefit from it to the extent which he thought they ought to do. During the year, £11,000 was set apart for depreciation of plant and other contingencies. That was £33 per cent. upon the net profits, and he contended that they would be in a state of security without so large a reduction from their profits. The honourable chairman had very properly alluded to the proceedings of the committee of the House of Commons on the subject of the gas supply. He (Mr. Gray) held the same opinions as had just been so well expressed—that the more their conduct was investigated, the better they would stand in public estimation. He did not believe there was a gas company in London that had anything whatever to conceal from the public. Their conduct was before the public, and they asked for the support of the public. It was quite clear that they would do nothing inconsistent with the public requirements; but, at the same time, they must take care that nothing was done inconsistent with the true interests of the gas companies. Every man engaged in business had a right to manage his affairs in his own way; and why any maximum price should be fixed upon their manufacture more than upon any other commodity of trade, he was at a loss to understand. With respect to the item in the accounts of "investment in railways," he was of opinion that railway bonds were not the right things for the company's money to be invested in, inasmuch as they were liable to depreciation from causes over which they had no control. Supposing the London and North-Western and the Great Western were in a position not to be able to pay their expenses, what became of the preference shareholders and the bondholders?

A DIRECTOR said they could seize half-a-dozen engines, and so pay themselves.

Mr. GRAY said he believed he was quite right in the views he had expressed, as they had seen many lamentable instances of persons presenting their bonds for payment, who were told that there were "no effects." He thought the directors had not exercised a sound discretion in selecting railway bonds as an investment for their money, as he did not consider it a safe investment. He rejoiced to see the growing prosperity of the company, but he wished to have a little larger participation in the improved profits of the concern.

Mr. RHODES said he had had great pleasure recently in visiting the works at Vauxhall and Kennington, and to find that they were in such a very substantial and orderly condition. The entrance to the works in Kennington Lane was like the entrance to a gentleman's park, and he felt that their engineer deserved great credit for what he had done. They were the cleanest and best-conducted works he had ever seen.

Mr. JOSEPH BOX said he did not agree with the suggestion which had been made by Mr. Wheeler, and would prefer, as a means of disposing of the surplus profits, that £1 should be added to present shares of £52, which, he said, would leave a balance of £3500 in hand. It was extremely gratifying to him to find that the expenditure was 2 per cent. less last half year than in the corresponding period of the previous year. If any one would second the motion that £1 be added to the shares, he was prepared to make that proposition.

Mr. WHEELER said he had merely made a suggestion, without intending to move any resolution with regard to the disposition of the surplus profits. He objected to the proposition of Mr. Box, inasmuch as no sound concern would ever try to increase its capital. His (Mr. Wheeler's) object was to relieve the board from the difficulty of having a larger amount in hand than they knew what to do with.

Mr. BECK called attention to the figures in the account. The amount of all the money they had in hand at the time they were made up was £35,000. If £2 per share were returned or added to their value, it would consume £18,000 of that sum, and the amount proposed by the directors to be apportioned as dividend this half year would require £16,380 more. If that were so, he would like to know how a concern like this was to be carried on? If all the money was to be returned to the proprietors, what was to be done for working capital? He wished to ask the chairman what the object of the investment-fund was?

The CHAIRMAN stated that they held considerable property on lease, and although forty years were unexpired, yet they had spent a large sum of money in building works upon that land; they felt that if they did not put aside a sum for the purpose of renewing the lease when it expired, they would eventually have to call upon the proprietors for a large amount. These reserves were made with a view to meet the termination of the lease, and to avoid making a call upon the proprietors. With respect to the subject of the surplus profits, he could state that it was one which had occupied the attention of the board a good deal. When they were paying low dividends of 3½ per cent., they felt that it would be hard upon the proprietors to ask for more money at that low rate of dividend, and the question was, whether they could obtain the money by borrowing it. They consulted their Act of Parliament, and found that there was not a clause in it under which they were enabled to borrow a single shilling, as they could not give a particle of security; and although some of the directors stated their willingness to incur personal responsibility, the number was so small, and the system of advancing money without security was felt to be so pernicious, that the idea was abandoned altogether. One advantage of having no borrowing powers was, that they were enabled to say they did not owe a shilling; and a further advantage was, that they had no preference shares overriding the original stock, and there was no person who could urge a prior claim to that of the shareholders; therefore, although it was a difficulty at the time, it was better to contend against it than to have a body of persons having a prior claim to others. With regard to the suggestion made by Mr. Wheeler, to return the amount of the last call of £2, that was a subject which had been considered by the board. When they made the call of £2, they found afterwards that the improvement of the works was so rapid that the directors were enabled to call the shareholders to allow them to take a larger amount for depreciation than had hitherto been the case. They felt that £1000 each half year was not enough, and they asked for a sum which would place them in a position of security with regard to their works and plant. If the dividend had remained at 3½ per cent., they would have had no such balance of profit as they were now able to show. Although they had power to make calls, that power was of a limited extent, and the board felt that if they returned the amount of the last call they could not get it again, and it might jeopardize future calls. They, therefore, felt it was better to allow the surplus profits to increase than place themselves in a legal difficulty with regard to the calls. He thought a dividend of 7 per cent. was one to which the proprietors could not object; and he thought the proprietors would prefer to have the call remain at that rate rather than have it refunded at a time when the interest of money was at so low a figure. He could assure them that the investment-fund would be carefully watched, and not a penny should be spent except in case of urgent requirement for the benefit of the company. With regard to the railway bonds, he might state that there were gentlemen on the board who were thoroughly conversant with such matters, and the money had been placed where they knew the companies were thoroughly solvent, where they were paying fair dividends, and the amount of borrowed money was small in comparison with the number of their shares. With regard to the surplus of £35,000, they had been reminded that it was a very large amount; but if the proprietors would refer to the last Christmas account they would find that it was only £20,000. They had, in fact, been incurring a summer quarter's expenditure with a winter quarter's receipts; and if they had been asked last Christmas for the return of money which was now suggested, it would have left in hand only about £2000 to meet all contingencies. With regard to the proposed addition to capital of £1 per share, he (the chairman) might be considered a prejudiced person, but he sincerely hoped that he should never belong to a concern in which the capital on which dividend was paid was not the absolute capital subscribed. To effect that arrangement, the process must be to pay back the £1 with interest, and then to make a call of £1 to get it back again; and he hoped the proprietors would not proceed in such a circuitous method as this. He could only say, that if the directors saw their way to declare a better dividend on a future occasion, they would rejoice to be able to do so.

Colonel HIGGINS said it was to him a very great pleasure to attend the meeting of a company that had a good balance in hand, as such things were very unusual in the present day. Considering the great improve-

ment that had taken place in their affairs, he thought the directors were entitled to the fullest confidence of the proprietors; and after the statement which had been made by the chairman, he thought it would only be grateful on their part that they should accede to the opinions that had been expressed on behalf of the board, rather than that the matter should be further discussed.

Mr. PERRY said he had the fullest confidence in the directors, who had, no doubt, acted with their usual caution and prudence; and though he did not wish to disturb the present arrangement they had made in reference to the dividend, he could not help expressing an opinion that the position of the company's affairs warranted the proprietors in expecting an increase in that direction.

The CHAIRMAN said it should be observed that, although they had written off for depreciation £4000 on the one side, on the other, they had expended on works £8000. If they had not been somewhat liberal in the amount set apart for this purpose, it was probable they would now be bordering upon a call.

The motion for the adoption of the report was unanimously adopted.

Mr. GIBBES (deputy-chairman) moved a resolution declaring a dividend of 7 per cent., free of income-tax, upon the paid-up capital of the company. He said he made this proposition with peculiar satisfaction, inasmuch as on former occasions it had been his lot to propose a dividend at the rate of only 3 per cent. A few years ago, such was the condition of the company, that they could only afford to pay that rate of dividend, but they had gradually gone on increasing from 3 to 7 per cent., and he therefore felt he had good grounds for offering the shareholders his congratulations on that account. Something had been said about the railway bonds, and, in reference to that subject, he begged to inform the honourable proprietors that the item of £7719 was an amount temporarily invested, and for which they had the security of six or seven railways of undoubted position. All those bonds were of very short dates, and could be converted into cash at any moment as readily as a bill of exchange; therefore the proprietors had not much to fear in this respect. The question of depreciation had also been adverted to as being excessive. They must bear in mind that their capital was £468,000, and the amount written off for depreciation was only 1 per cent. for the half year; and no one acquainted with gas-works would say that they considered that a large depreciation. There had been something said about the large balance in hand, and it had been quoted against the directors that they had a plethora of wealth. Let it be remembered that the accounts now before the proprietors were made up to the 30th of June, at which time it was very true they had £35,100 in hand. But what had been done with that sum? They were about to disburse £17,000 of it that very day, in payment of the dividend which he had just submitted a motion for the adoption of, and therefore there was one half of this large balance at once disposed of. The remainder of it was owing at Midsummer for bills which had since been paid, and the chairman was perfectly right in saying that, had they paid the amount then due, there would not have been a floating balance of more than £2000 or £3000. If the proprietors thought that that was too much for the directors to have in hand to enable them to carry on a concern in which £486,000 was invested, he should be very much surprised indeed.

A PROPRIETOR: What interest do the railway bonds pay?

Mr. GIBBES said about £4 per cent. upon the average. He was not unwilling that the directors should take into consideration the returning of £1 to each of the proprietors, but the present was not the time for it. If the proprietors would only continue to give to the board that confidence which they had hitherto shown, and the company enjoyed the same measure of prosperity they now possessed, it would be the anxious wish of the directors to get rid of some of this money. He concluded by congratulating the proprietors on the present state and prospects of their affairs.

Mr. BOX: You have not touched upon the undivided balance of £12,000.

Mr. GIBBES said it was quite evident the directors must have a balance to go on with, or go to their bankers and borrow the money which they required.

Mr. BECK seconded the motion.

After a few remarks from Mr. WHEELER and Mr. GRAY, the motion was put and carried unanimously.

On the motion of Col. HIGGINS, seconded by Mr. WHEELER, a vote of thanks to the directors was very cordially adopted.

The CHAIRMAN acknowledged the vote, and the proceedings terminated.

THE PUMP WATER OF THE METROPOLIS.

An important investigation, instituted by the medical officers of health of the metropolis, into the quality of the water supplied from the London pumps has just closed, and the revelations that have resulted therefrom are of a somewhat startling character, the water, in most instances, having been proved to be strongly impregnated with the most abominable matters and deposits, and gases most dangerous to the health of the consumers. An agitation on the subject first arose out of some proceedings adopted in the parish of Marylebone, where the medical officer of health, Dr. Thomson, after a searching analytical examination of the waters obtained from certain pumps in the district, advised that the pumps should be closed, the water being, in his opinion, such as to seriously endanger the public health. The water Dr. Thomson found strongly mixed with the surface drainage of the streets and the percolations from the sewers, as likewise being strongly impregnated with even gas, which had escaped from the gas-pipes beneath the street. As in all such movements, strong objections were got up, on the old-fashioned plea, "infringement on the liberty of the subject;" but a majority in the vestry overruled all objections, and the pumps were ordered to be closed.

The last pump thus closed, and eventually removed, the well beneath being filled up, stood at the corner of Park Street, Oxford Street. Dr. Thomson reported, as regarded this pump, after speaking of the brickwork of the well being in a very dilapidated and ruinous state:—"The bricks forming the walls were saturated with water nearly to the mouth of the well, although the depth of water in the bottom of this well was only 2½ feet. This fact shows that the well is simply a pit sunk in a porous soil, and that the surface-water of the street, saturated with the manure of the road, permeates the sides of the well; this, in truth, is the source of that water supply. The water I have analyzed, and I find it to be more impure than when I examined it in 1856, as exhibited in the following table:—1856, total impurity, degrees or grains per gallon, 42·64; organic impurity, 4·96. 1858, total impurity, degrees or grains per gallon, 49·60; organic impurity, 5·52. I find it to contain nitric acid and ammonia, which are unequivocal tests of the presence of organic animal matter. The amount of ammonia I find to be 109 grains per gallon, which is equivalent to 307 grains of carbonate of ammonia. I may add that the smell of gas was very strong in the earth surrounding the well, and that the gully-drain was stopped, and the fluid contents of the drain oozed into the well. I should be negligent in the discharge of my duty if I did not strongly urge the extreme danger of such water being used by the public." Notwithstanding all this, and a confirmatory report from the district surveyor, a strong phalanx of opposition was raised by the inhabitants, all of whom insisted on still drinking the water, they describing it as "pellucid and beautiful." However, their objections were set aside, and the pump was removed.

Such evidence as this emanating from Dr. Thomson led to the inquiry by the medical officers generally; and in their report, which contains the opinions of some thirty of the most talented, shrewd, and scientific men of the day, pump water as at present supplied in the metropolis is condemned as being unhealthy and exceedingly dangerous for drinking purposes.

Dr. Druitt, medical officer of health for the parish of St. George, Hanover Square, in speaking of the water from the Park-Street pump, says:—"The water was complained of for being slightly turbid. I took some home for examination. It smelled strongly of sewerage, so strongly that some persons said that it must be the smell of coal gas; but on examining the deposit from the water it was found to contain yellow flocculent organic matter, which I believe to have been fœces." Dr. Druitt then, after speaking of the closing of several pumps in his district, observes that a heavy storm might suddenly flood such wells with sewerage, "and thus we might have diarrhœa or cholera and be consoled by a scientific inquiry when the mischief was done."

Then follows the opinion of Dr. Lankester, medical officer for St. James's, in which parish stands the notorious "cholera pump"—the Broad-Street pump—the water from which caused a fearful devastation from cholera amongst its consumers during the outbreak of that dire disease in 1854. Dr. Lankester remarks in his observations—"The organic matters found in the surface-wells of London are of precisely the same nature as those found in rivers which are the receptacle of house sewerage. The most observable difference arises from the fact that the water passing into the wells undergoes a process of filtration, so that the animal matters are more perfectly dissolved and decomposed than they are generally in the river waters. Hence the surface well waters are clearer, whilst the carbonic acid of the decomposed matter makes them sparkling, and the nitrates they contain give them a pleasant coolness to the taste. Nothing could be better adapted to lure their victims to destruction than the external qualities of these waters; hence the worst of them are the most popular for drinking purposes. The most impure water in this parish is that of the Broad-Street pump, and it is altogether the most popular. The large amount of mortality from cholera in this parish in 1854 arose from the popularity of that water, persons sending from a distance to obtain it, and dying of cholera wherever it was drunk."

Mr. John Simon, F.R.S., F.R.C.S., medical officer of the General Board of Health, in a communication addressed to Dr. Lankester, alluded to the outbreak of cholera through the water used from the Broad-Street pump, as also to the more recent outbreak from the same cause—impure pump water—at West Ham. Mr. Simon then says: "Pumps supplying such waters can never, in London, be otherwise than dangerous sources of supply. The porous soil from which they suck is that into which our cesspools and leaky drains discharge a great part of their fluids—sometimes even a solid part of their contents—and in which, till very recently, all our interments have taken place. It is a soil which consequently abounds with putrid and putrefiable matter."

Dr. Letheby, medical officer of health for the City, in confirming such observations, remarks: "The man who habitually makes use of the London pump water is living in perpetual danger of disease." The other numerous opinions are to the same effect; and Dr. Barnes, of Shoreditch district, in condemning the water supplied from pumps, very reasonably adds—"In my district I certainly should have adopted the course you have, were it not for the fact that a considerable number of poor people can get no other water; and, as water of some sort is a prime necessary of life, I have been compelled to let things remain." He then says: "I look forward to the time when the proper water supply will justify me in restricting the use of the surface well pumps to watering the roads."

Mr. C. J. F. Lord, medical officer of Hampstead, after instancing the unhealthy quality of pump water in populous places, goes still further; Mr. Lord remarking—"Much illness has arisen at Brighton and Worthing, also at Sandgate, from drainage percolating into the wells."

Dr. Griffith, of Clerkenwell district, sums up, after observing that the idea of drinking the excretions of other human beings is sufficiently repulsive to counterbalance the attractive physical qualities of the pump water:—"Moreover, the shallow well water receives the drainage water of the Highgate Cemetery, of numerous burial-grounds, and of the innumerable cesspools in this district. The clay rises high at Highgate Hill, so that the rain-water which percolates the soil on the London side of the cemetery flows towards the metropolis. This source of contamination might have been prevented by forming the cemetery on the northern side of Highgate Hill instead of on the southern side, where it at present exists."

Such are the results of the important investigation that has been instituted in this matter: first, with the laudable idea of warning the public against such a fearful and disgusting source of disease; and, secondly, with the object of remedying the evil. This can, it would seem, be easily attained by the entire removal of all the pumps and the filling-up of the wells; while, at the same time, stand-pipes, connected with the water companies' mains, can be erected in their stead to supply the poorer classes with a wholesome supply of water, the tired and thirsty wayfarer with a pure and uncontaminated draught.

MESSRS. CROLL AND RAIT'S FACTORY COMPETITION.—The following list of the tenders for Messrs. Croll, Rait, and Co.'s gas-meter manufactory, &c., to be erected at Kingsland by Mr. William Lee, the architect, has been forwarded to us; and, considering the wide estimates engineers and architects are in the habit of seeing, the present list must be considered to reflect great credit on the builders; and it clearly shows that each of them has gone into the matter with the necessary knowledge and judgment of the several works:—

Blanchard	£2358
Denton	2178
Case	2107
Newman and Man	2087
Hocken	2076
Perry	2056
Walton	2044
Wilson	2041
Wardle and Baker	2005
Wills	1999
Maeers	1995
Hill	1963
M'Lennan and Bird	1949

These tenders include the old buildings and materials, but are exclusive of fittings.

DARTMOUTH GAS-WORKS.—A short time since the price of gas supplied to this beautiful and thriving town was 8s. 6d. per 1000 cubic feet, and the quality of the gas so supplied was of a very inferior character. In consequence of the dissatisfaction created by this state of things, the Dartmouth Gas, Coke, and Coal Company (Limited) was organized, with a capital of £3500; and, under the advice of Messrs. T. Atkins and Son, of Chepstow, engineers and contractors, a new set of works have been organized. The old manufactory and plant were purchased for the sum of £1200, and more effi-

cient machinery, able to produce five times the former quantity of gas, erected in their place. The tank of the gasholder is of brickwork and cement, close to the quay wall, and the bottom at five feet below neap tides. The carbonizing power is capable of working off five tons of coal per twenty-four hours, with adequate condensing and purifying capacity, and storage room for 20,000 cubic feet of gas: the diameter of the outlet main is six inches. The whole of the new plant was completed for £1550, and the town was first lit by the new works on the 20th of August last. The directors of the company, in opposition to the advice of Messrs. Atkins, have decided upon retaining the old mains and services in the interior of the town.

ARTIFICIAL PRODUCTION OF COAL.—M. Baroulier stated to the Academy of Sciences, Paris, that he had invented an apparatus by means of which he is able to expose vegetable matter, strongly compressed and enveloped in damp clay, to a long-sustained temperature of from 390 to 572°. This apparatus, without being absolutely close, prevents the escape of gas or vapours, so that the decomposition of the organic substances goes on in a medium saturated with humidity, and under a pressure which prevents the complete separation of the elements of which they are composed. On placing wood sawdust, of different sorts, under these conditions, the author obtained products which in appearance and properties resembled sometimes shining coal, and at others dull coal. These differences may be referred to the conditions of the experiments, or to the nature of the wood employed; and perhaps it is thus that we may explain the mode of formation of the laminated coals, or those composed of a succession of layers alternately shining and dull. The stems and leaves of plants, embedded between layers of clay, leave, under the above circumstances, impressions altogether similar to those of the coal-fields.

Price Current.

CASTINGS, PER TON.

Average Weight of Cast-Iron Gas-Pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle.	Wales.	Yorkshire, Derbyshire, and Staffordsh.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	4 10 0	2 14 0	3 0 0	4 0 0	4 5 0
1¼ and 2 inches Socket-Pipes	7 15 0	7 0 0	7 5 0	7 10 0	7 5 0
2½ and 3 „ „	7 5 0	6 15 0	7 0 0	7 5 0	7 0 0
4 and 5 „ „	7 5 0	6 10 0	6 15 0	7 0 0	6 15 0
6 in. and upwards „	7 0 0	6 5 0	6 5 0	6 15 0	6 5 0
Retorts, 1st fusion, hot blast	6 15 0	...	6 15 0	7 0 0	6 15 0
„ 2nd „ cold „	7 15 0	...	7 0 0	7 5 0	7 0 0
Tank Plates, ⅜ thick and above	7 5 0	6 10 0	6 15 0	7 0 0	6 15 0

WROUGHT-IRON TUBING,

Subject to 40 per cent. Discount.

	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 ft., per ft.	1 8	1 0	0 10	0 7	0 5	0 4¼
„ „ „ 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting-Pieces, or Long Screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows—wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
„ with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Plain Sockets [Nipples	1 3	0 9	0 8	0 6	0 5	0 4
	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 0	—

COALS, PER TON.

Newcastle.—Unscreened.		*Scotch Cannel.*	
Whitwell Primrose	6s. 3d.	Boghead, at Leith	32s. 0d.
Medomsley, Eighton Moor, and Burnhope	6 6	Kirkness, best	23 0
Pelaw	6 9	Capeldrae, 1st quality	20 0
New Pelton, Peareth, South Pelaw, Washington Hutton, and South Peareth	7 0	„ 2nd „	12 6
Pelton	7 9	Lesmahago, at Glasgow	25 0
Ramsay's Newcastle Cannel	16 0	„ „ Leith	27 6
		Arniston	22 0
		Wemyss	20 0
		Knightswood	18 0
		Pirnie	15 0

SUNDRIES.

Best Newcastle Fire-bricks	per 1000 60s. 0d.		
„ clay	per ton 12 0		
Cliff's Fire-bricks, at Wortley	per 1000 57 6		
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Tough Cake Copper ... per ton	£107 10s.	Foreign Spelter ... per ton	£23 15s.
English Pig Lead ... „	21 0	English Block Tin ... „	118 0
Welch Bar Iron, in London „	7 0	Banca ... „	116 0
Tarred Rope Yarn	per cwt. 26s. 0d.		

FREIGHTS.

Coastwise—Newcastle.—Per Ton.		*Foreign.—Per Keel.*	
Chatham & Rochester	5s. 3d.	Boulogne & Calais	£6. 15s. to £7 0s.
Cork	7 3	Barcelona	22 0
Dover	—	Bordeaux	13 0
Dublin	7 9	Cadiz	£15 to 15 10
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Hastings	—	Genoa	21 0
London	5s. 3d. to 5 6	Hamburg	£7. 10s. to 7 12 6
Lowestoft & Yarmouth	4 1½	Havre	8 5
Lynn	4 6	Leghorn	20 0
Portsmouth	6 6	Lisbon	£15 to 15 10
Plymouth	6 9	Rotterdam	7 0
Whitstable	—	Stettin	10 0
Weymouth	—	Trieste & Venice	£21 to 23 0

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GAS-METER MANUFACTURERS, &c.
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Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide Valves, &c. &c.

W. and G. would respectfully call the attention of Gas Engineers and Managers to their Station-meters, having made and erected the largest in use at the present time, two of which may be seen at the Stockport and Liverpool Gas Works, on application to the respective Engineers.

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Manufacturer of every description of Fire-Bricks, Lumps, Quarries, Shields, Flue Covers, &c., to any size or shape required.

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TO MODEL OR DRAWING.

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ESTABLISHED IN 1795.

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To meet the yearly increasing demand of UPWARDS OF THIRTY SEASONS and to carry out the late improvements in the manufacture, the Premises have been re-erected and much enlarged, and Engineers may rely WITH CONFIDENCE on their orders being completed with a greater regard to despatch than by any other House.

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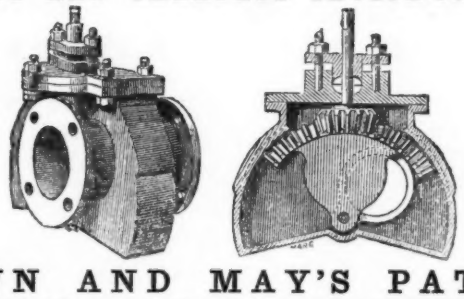

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These Meters are as simple and durable as the Gas-Meter, and as correct as that instrument in the registration of the fluids passing through them.

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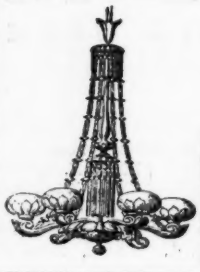

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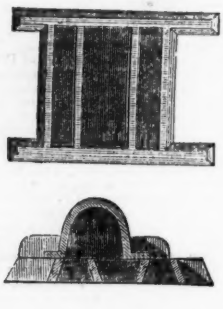
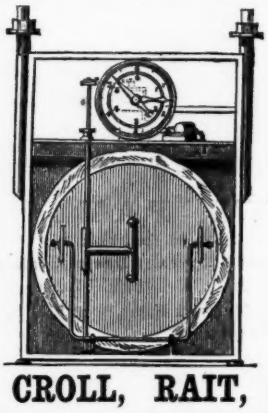
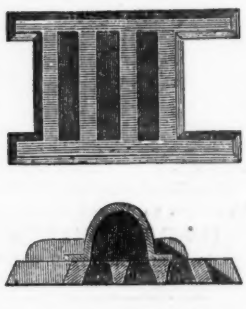




OLD VALVE.



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FACTORY—Blundell Street, near the Railway Station, Caledonian Road, N.
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Messrs. CROLL, RAIT, and Co. beg to call the attention of Gas Companies to their Improvements in Dry Gas-Meters, which secure a steady light under all circumstances.

In forming the Valve-Seat of the Dry Gas-Meter it has hitherto been usual for the Bars to be equal in width to the openings; but, by the extent of the surfaces thus brought into contact with the Valve or Cover, it is found that fluid accumulates, and, during part of the motion of the Valve, partially closes the passage, thereby causing an oscillation in the lights.

An Improvement in the Manufacture now introduced and patented by Mr. CROLL consists of very considerably reducing the width of the Surfaces or Bars, as in the drawing of the New Valve, retaining only such width of bar as is necessary to secure correct measurement.

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These Improvements remove at onee any liability to unsteadiness of light, and at the same time secure (from the Valve working more evenly) a greater certainty of accurate registration.

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